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COVID-19'S IMPACT ON ENERGY

GREEN RECOVERY

SOLAR POWER

Includes editorial contributions from:



Ditte Juul-Jørgensen

Director-General, DG Energy,
European Commission



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Director of Sustainability,
Technology and Outlooks –
International Energy Agency



Morten Helveg Petersen

MEP, Denmark Renew Europe



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Foreword

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European Energy Innovation is published by:
Prologue Media Ltd
1a Shire Lane
Chorleywood
Hertfordshire WD3 5NQ
United Kingdom

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Design & Production

RayHeathDesign.com

Website design

pulseart.co.uk

Print

The Magazine Printing Company,
Enfield, Middlesex, United Kingdom

Perhaps not since the financial crisis of ten years ago has one single issue commanded so much of the world's attention. And it is perhaps many decades since our way of life - and even our lives - have been as imperilled as now. Lockdown may have flattened mortality curves, but we don't yet know whether sufficient time has been bought for an effective vaccine or treatment to emerge, or if the virus will become annual feature like influenza. Lockdown has also caused profound economic and climate impacts: emissions have dropped sharply, jet fleets are grounded and wildlife has begun exploring spaces now left unfrequented by humans - while Europe remains divided over the Commission's proposed €750 Billion recovery package.

Meanwhile, continuing rise in atmospheric CO₂ levels (currently 413ppm) mirrors continuing decline in the mass of polar ice (currently by 427 Gtonnes per year). And all that ice must be going somewhere when it melts...

...while recalibrating the European economy in favour of green energy and sustainability requires that economic growth (or return to anything like it) be completely decoupled from emissions. So we are delighted that Mechthild Wörsdörfer has chosen to explore the impact of Covid 19 on the energy sector. She sets the scene well: the IEA Global Energy Review suggests that by the end of the year, energy demand may decline by 6% (seven times greater than in 2009); and emissions by 8%, to the lowest levels since the late 1950s. She goes on to explain how the IEA's call to put clean energy at the heart of economic recovery is manifest in Ministerial Roundtables, the World Energy Outlook Sustainable Recovery Report and the Clean Energy Transitions Summit slated for the Summer. Meanwhile, Ditte Juul-Jørgensen, Director-General, DG Energy, argues that Europe must show leadership by embracing the Green Deal, an opportunity to "transform our economy and society" based on security of supply, affordability, and sustainability. Reminding us that the cheapest energy is the energy that we do not use, she puts energy efficiency at the heart of a policy that also addresses renewable energy, natural gas as a transition fuel and public and private financing to generate up to €1 Trillion. The target: net zero emissions by 2050. The startling title chosen by Adel El Gammal illustrates perfectly how, even in the context of the pandemic, climate change represents the single most relevant policymaking priority in Europe. Bringing a sharp perspective with phrases like "...a historical and decisive turning point in the evolution of our modern society", he discusses how Covid 19 has highlighted the vulnerability of the globalised economy and describes how decentralised economies with short supply chains, backed up with strong State controls over fundamental public services will nevertheless require Governments to justify their actions.

Morten Helveg Petersen MEP argues that we should use the crisis "as an opportunity to make a green recovery of Europe." He argues for a Green Recovery Programme targeting local European job creation in such areas as renovation, decarbonisation of the heat sector, electrification (with green electricity, of course) and energy storage. But time is pressing: "It is imperative" he says "to grab this chance and initiate these projects as soon as possible in order to save our businesses but also our planet, while creating as many sustainable jobs as possible for European citizens."

A century ago, the world emerged from one conflict only to be convulsed by a pandemic, Depression and a second war. And yet from the death, the ashes and the rubble, there emerged a period of unparalleled peace and prosperity. Now that's a thought...

...while there is much more for you to read inside...

Michael Edmund
Editor

There is no recovery without the European Green Deal

By Ditte Juul-Jørgensen, Director-General, DG Energy, European Commission

The EU has pledged to move to a climate-neutral economy by 2050. At the same time, we have been hit by a worldwide pandemic and a severe economic crisis. In this time of uncertainty, Europe and the European Union must show leadership and help Europeans on the road to recovery. In doing that, we need to learn from the past and embrace this opportunity to transform our economy and society with the help of the European Green Deal for all Europeans. This means increasing investment, creating jobs and innovating for sustainable solutions. There is no policy area more suitable to start with than the energy field.



If we look at Europe's greenhouse gas emissions, we see that energy generation, transmission and consumption are responsible for 75% of the EU's emissions. Together with European Member States and the European Parliament, we have already done a lot to make EU energy policy legislation fit for the new challenges. Finalised in 2019, the Clean energy for all Europeans package addressed the three main priorities of EU energy policy: security of supply, affordability, and sustainability. The European Green Deal aims to continue in this path across all sectors and complete the transformation of our energy system into one that is not only carbon-neutral, but also, more cost effective, energy efficient and secure. At the same time, some sectors face a larger transformation than others and so we must ensure that we do not leave any person or region behind. We must make the transition a fair and just process that everyone is a part of.

The principle of 'Energy Efficiency First' is at the heart of the European Green Deal. The cheapest and cleanest energy is the one we do not use, so the more we can do to reduce energy consumption, the better. This is also good news for consumers – saving energy will not only cut emissions, but also lower their energy bills.

Our main thrust of action in this area will be to improve the energy efficiency of buildings. Buildings are one of the main energy consumers in the EU, as well as being responsible for a large amount of GHG emissions. Embracing renovation on a massive scale could not only help our climate

and environment, but also kick start the recovery from the coronavirus crisis. This so-called "Renovation Wave" should trigger economic activity, create jobs and support small local companies, while reducing energy bills and improving people's quality of life. A crucial aspect will be the inclusion of social housing in the wave, to help address the challenge of energy poverty in the EU. Our latest figures indicate that up to 50 million people around the EU are not able to properly heat their homes. In this day and age, this is simply not acceptable.

Energy efficiency is important, but so is the source of our energy. We need to increase the share of renewable energy by making it easier to incorporate renewables into our energy system. For this to succeed, we must move towards an integrated energy system to build stronger inter-linkage of the electricity, heating and cooling, transport, gas, industry, and agricultural sectors. In addition, in order to further boost decarbonisation, we will present a new strategy to support offshore renewable energy, addressing the opportunities and challenges therein, such as the impact on energy grids and markets, the management of maritime space and the industrial policy dimensions of offshore wind.

Supporting renewable energy as well as investing in big energy infrastructure projects that stimulate the economy are necessary pre-conditions for a climate-neutral energy system. We need to use this moment as much as possible to drive through structural change. If we make our energy systems greener,

more efficient, smarter, and better integrated now, during this crisis, we can bring deeper and lasting positive change.

Making the European Green Deal a reality will also depend on funding the necessary investment – and the smartest combination of public and private finance. Just to meet our 2030 climate and energy targets, we need an estimated additional €260 billion in annual investments. Public money alone cannot foot this bill. In fact, we will have to rely primarily on the private sector.

By setting clear long-term goals, we are already reducing the risks for investors. Public spending can also play an important role in leveraging private support and providing guarantees. In this context, the Commission has already put forward a Green Deal Investment Plan, which, over the course of the decade, can generate as much as €1 trillion to fund sustainable projects.

Our efforts must not endanger the security of energy supply that we enjoy in the EU. For this, we need a forward-looking, modern, secure

and smart energy infrastructure to safeguard it. And we must pursue the diversification of our sources of energy supply to decrease import dependency. Natural gas, which still constitutes almost one quarter of the EU's energy mix, has a role to play in the medium term, as a substitute for more polluting sources like coal, lignite or oil shale. Ultimately though, the gas we use in the EU has to be clean. We are already working on creating an environment where clean gases can have a significant presence in the EU gas sector.

To conclude, we know that moving towards a climate-neutral green economy by mid-century will be a challenging and long journey and that the energy sector must contribute. But we are starting from the common foundation of the Energy Union and we are more efficient and stronger by joining forces at EU level. This is a real opportunity for Europeans. The European Green Deal is the EU's recovery and growth strategy: together with the digitalisation of the EU, we will increase our strength and resilience and be ready for future crises, whilst at the same time reducing our net emissions to zero by 2050. ●

“ Making the European Green Deal a reality will also depend on funding the necessary investment – and the smartest combination of public and private finance. ”

Turku being turned into a Climate Positive City

In Turku Student Village, there is a housing complex the size of a city block that produces emission-free energy even for the needs of neighbouring buildings. In a European Union Horizon 2020 Lighthouse project, the cleantech area will be expanded into an entire city district. A climate positive water system is also being developed in Turku.

A flower-shaped building the size of a city block, called Aitiopaikka, was completed in Turku Student Village last year. The building has 255 apartments and over 300 inhabitants.

Five hundred solar panels have been installed on the roof of Aitiopaikka. At times, they produce even more energy than needed in the building.

“In this case, the excess electricity is transmitted to neighbouring buildings through the power grid of the area”, says Real Estate Engineer *Joonas Rantala* from the Student Village Foundation of Turku.

District heat is used for the heating of Aitiopaikka. In the Turku region, already 80 per cent of district heat is produced using renewable fuel and modes of production. The percentage is constantly increasing.

“Underneath Aitiopaikka, there is also

a wide gathering area of ground heat. It produces half of the heating power needed for the large neighbouring building Ikituuri.”

Coming next – a climate positive city district

Another European Union Horizon 2020 Lighthouse project called Response is also now implemented in Turku Student Village. In this project, the area of climate-friendly technology is significantly expanded.

The idea is to build an entire climate positive city district.

“For instance, heat pumps connected in series with high efficiency and efficient heat exchangers will be used in the area. A solar plant will be placed on the roof of a new building called Tyysija. In addition, older buildings will be renovated to make them more energy efficient; examples of helpful measures include windows with

quadruple glazing and heat recovery from air conditioning. Through the power grid of the area, energy will be transmitted from one place to another when needed”, Rantala lists concrete examples.

Piling of Tyysija is already underway. Extensive negotiation work and planning work is also currently undergoing.

Experts in the field across Europe

Development Manager at the City of Turku *Björn Grönholm* says that several businesses, expert organisations, research institutes and universities from both Finland and across Europe take part in the project. Currently, there are as many as 57 partners.

“For instance, there are top experts in solar energy, heat pumps, battery technology, automation and 5 G connections. One of our important sparring partners is the city of Dijon in France where a slightly similar Lighthouse project is currently ongoing.”

Grönholm states that the idea is to find new innovative solutions that could also be easily utilised elsewhere.

The water system was harnessed for energy production

A climate positive city is being built in Turku Student Village one house and one city district at a time. There is also much happening elsewhere, as the entire city is an experimentation platform for cleantech.



Joonas Rantala



Björn Grönholm



The excess electricity produced by solar panels at Aitiopaikka can be transmitted to neighbouring buildings. Photo: ©Turku Energia, Esko Keski-Oja

For instance, a climate positive water system has been under development in Turku.

“There is top level water expertise in the Turku region. The efficient treatment of wastewater has already had a positive impact on the state of nearby sea areas. What is even better is that loads of environmentally friendly energy is also generated in the process”, Grönholm says.

At the wastewater treatment plant in Kakola, district heat is made with heat pumps out of waste heat in wastewater. The waste heat would otherwise be left unutilised. At the same time, district cooling is

produced for cooling purposes.

District heat from Kakola is used for heating approximately 15,000 apartments.

“While wastewater treatment plants are usually the worst energy guzzlers in municipalities, in Turku we have a wastewater treatment plant that is one of the biggest producers of district heat.”

Approximately 10 per cent of all district heat needed in Turku is produced in Kakola.

An underground experimental laboratory of new energy

Björn Grönholm describes the

underground wastewater treatment plant in Kakola as an experimental laboratory of new energy.

“Energy is also produced for example by using a turbine placed in a wastewater effluent pipe”, he states.

Naturally, also sludge generated in Kakola is utilised. Liquidised biogas for road traffic use is made out of it.

“We produce clean energy locally. In addition, local production is very good from the point of view of security of supply”, Grönholm states. ●

Text: Matti Välimäki

Translation: Aino Koivisto

The best climate city in Europe

The objective of Turku is to be carbon neutral in 2029. However, this is merely a milestone. Afterwards, the journey continues towards climate positivity and the city will eventually sequester more carbon than it releases into the atmosphere.

The ambitious goals of Turku and the climate measures that have already been taken have also been internationally acknowledged.

Turku has been selected the winner of European Covenant of Mayors Climate Award 2020 as the best mid-sized Climate city. The best climate cities are selected among the ten thousand cities that are part of the EU Covenant of Mayors for Climate and Energy.

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Covid-19's impact on the energy sector

By Ms Mechthild Wörsdörfer (pictured), Director of Sustainability, Technology and Outlooks – International Energy Agency



The coronavirus (Covid-19) has created the biggest global crisis in generations, sending shock waves through health systems, economies, and societies around the world. Faced with an unprecedented situation, governments are focused on bringing the disease under control and reviving their economies.

The energy sector is also severely affected by this crisis, which has slowed transport, trade and economic activity across the globe. The IEA's analysis, published in our *Global Energy Review 2020*, shows that global energy demand declined by 3.8% in the first quarter of 2020 and that months-long restrictions on economic activity could lead to a drop in energy demand by 6% by the end of the year. This is the largest drop in 70 years and seven times greater than the 2009 financial crisis. The story is similar for global CO₂ emissions projections as we expect a decline of nearly 8% in 2020, where Europe might see the lowest levels since the late 1950s.

Global energy investments are also severely affected by the crisis. As shown by our *World Energy Investment report* released end May, a fall in businesses' capital spending of US\$400 billion – one fifth of 2019 levels – could be expected in 2020. Investment activities have been disrupted by lockdowns but also by a sharp fall in revenues, especially for the oil and gas sector. Europe's estimated decline is around -17%, with investments in electricity grids, wind and efficiency holding up better than distributed solar PV and oil and

gas, which see steep falls.

To avoid a big rebound, we need sustainable recovery plans based on smart energy policies. In this context, the EU's Covid-19 recovery package and Multiannual Financial Framework (MFF) will be important as well as continued commitment from the EU to the European Green Deal - as a growth strategy and to ensure a just transition towards a climate neutral Europe by 2050.

Near-term opportunities for jobs and cutting emissions

In March, the IEA's Executive Director Dr. Fatih Birol was the first leader of an international organisation to make a call to governments to put clean energy at the heart of economic recovery. Numerous IEA events have been held since to examine Covid-19 implications across the energy sector, including Ministerial Roundtables on *clean energy in economic recovery*, *mobilising investment in sustainable and resilient electricity systems*, *impacts on Africa's energy sector* as well as our *annual Global Conference on Energy Efficiency*. These events will culminate in the IEA's Clean Energy Transitions Summit on 9 July 2020, which will gather a grand coalition of leaders representing the global energy community to explore pathways to a sustainable recovery, on the way to COP26.

As a basis for this discussion, we will release the *World Energy Outlook Sustainable Recovery report* this June. The report will provide input on how governments most effectively can use economic recovery to boost jobs while advancing clean energy

and innovation. Two promising areas could be highlighted herein, namely, energy efficiency and renewables, both providing millions of jobs today and where we see a huge economic and sustainable impact.

For energy efficiency actions such as grants, rebates, tax incentives and auctions could stimulate demand and cost-effectiveness. Governments should however build upon pre-existing structures and support programmes that can mobilise stakeholders quickly. Renewables were the only energy source that experienced a growth during the first months of this year but we expect an overall decline in demand this year compared to 2019. So, to maintain renewable's progress and keeping jobs, governments should focus on re-confirming if not increasing their renewable ambitions, bringing greater clarity to the uncertainties that the industry is facing.

The role of clean energy technologies for reaching long-term energy objectives

Energy efficiency and renewables like wind and solar PV – the cornerstones of clean energy transitions – are good places to start. However, more will be required to put the world on track to meet long-term energy and climate

goals. IEA analysis has repeatedly shown that a broad portfolio of clean energy technologies and innovation will be needed to decarbonise all parts of the economy.

Batteries and hydrogen-producing electrolyzers stand out as two important technologies. Both industries have the potential to create many more jobs across their entire supply chains. The technologies will also be important to reduce emissions in sectors such as shipping, aviation, long-haul trucks, the iron and steel sectors or chemical industries. The outlook for these technologies is more promising today than a few years ago which is why these technologies deserve a special place in any economic stimulus package today.

The IEA's tracking report on clean energy technologies (TCEP) shows the world's progress on key technologies and sectors for reaching long-term policy objectives. Still many of the key technologies are not on track. Considering the wind and solar PV took decades to develop, governments' policy and RD&D support to key technologies such as CCUS, hydrogen and batteries will be crucial. The IEA will publish the *Energy Technology Perspectives*

Special report on Clean Energy Technology Innovation on 2 July 2020, which will discuss these and other attributes of technologies that are particularly suitable for fast clean energy transitions, in sectors that are more difficult to decarbonise, the full report *Energy Technology Perspectives 2020* – will be released in September 2020.

The EU as a great opportunity to take the lead on sustainable recovery

How governments can best deal with the implications of the pandemic is still evolving but the clean energy transitions should be at the centre of economic recovery plans. Moving forward, the IEA sees a crucial role for all governments in Europe and beyond in tackling this crisis and the recovery to come out of it by focussing on these key areas of clean energy technologies. The European Green Deal provides the EU with a very clear and unifying strategy for economic growth and a pathway to carbon-neutrality. The strong backing of the 'European Green Deal' from the leaders of the EU Member States and the European Commission will be crucial if the EU wants to be the first climate-neutral continent as expressed by President von der Leyen in her Agenda for Europe. ●

“ In March, the IEA's Executive Director Dr. Fatih Birol was the first leader of an international organisation to make a call to governments to put clean energy at the heart of economic recovery. ”

Intermodal (E-)Mobility Stations in Munich

By Stefan Synek (EU Project Manager CIVITAS ECCENTRIC)

As part of the EU-funded CIVITAS ECCENTRIC project, Munich has set up four mobility stations. The multimodal mobility offers are a real alternative to car ownership and can help to reduce emissions.

Financed by the EU's Horizon 2020 programme, CIVITAS ECCENTRIC is a four-year project that develops smart mobility. Within CIVITAS ECCENTRIC, the cities of Turku, Madrid, Munich, Ruse and Stockholm are working together to overcome challenges related to mobility in suburban districts and achieving transport and city logistics that is clean, silent and CO₂ emission-free.

Background

The northern area of Munich is growing twice as fast as the overall city leading to an increasing number of road and mobility users, an overburdened traffic network and high emissions. Several former barrack sites are currently under conversion into new housing areas in order to accommodate the tremendous increase in population. This new area, called Domagkpark and Parkstadt Schwabing is consequently supposed to be pilot area of the project CIVITAS ECCENTRIC to promote sustainable mobility. Currently there are only little alternatives to individual car use existing.

Correlating to this growth of population and traffic, the project area aims to build less than (the obligatory) 1.0 parking lots per household in Munich as well as to prove the functionality of this approach through the integration of attractive alternatives for more sustainable mobility modes.

In order to achieve easily accessible and user-friendly services for mobility as a real alternative to individual car ownership, the development and implementation of mobility stations is part of this approach.

How mobility stations work

Mobility stations combine and provide





different types of mobility services and ensure that suitable means of transport are available at any time in order to reduce private car ownership of residents and customers. The innovative aspect is to combine several sharing mobility technologies (car-sharing (stationary, free floating, electric), (e-) scooters, cargo- and normal bikes) in connection and complementation with the use of public transport. The provision of

multimodal mobility service allows residents to live a private-car-free-lifestyle or at least have significant lower mobility costs and reduce emissions. Mobility stations feature a new design and are a new means of providing access to these services in Munich. They are combined with new regulations that enable reserving parking space only for carsharing vehicles. The stations are provided by the City of Munich on public space offering a platform for all interested private mobility suppliers.

emissions regarding NO₂, CO₂ and PM compared to non-users of mobility stations living in the area.

But there is still a high percentage of people who know the vehicles and services of a mobility station but do not use them. In general, the usage rate of mobility stations is low and a significant positive mode shift towards more sustainable transport options could not be evaluated within the short project lifetime. Residents obviously need more time to change their mobility behavior. To raise the awareness of the mobility stations and make them more visible, residents wish to have a more striking color marking of the station and to integrate the service into Munich's mobility apps.

Evaluation and Results

An evaluation of mobility stations in the project area, using a two-wave household survey (05/2018 and 10/2019), shows that residents who are making use of the mobility offers are very satisfied with the mobility stations and the selection of vehicles as well as the services which are being provided. Statistics showed that most users of the mobility station use at first place carsharing followed by bikesharing and e-scooter-sharing options. Evaluation results indicate that there was an increase of the system usage when a marketing campaign for the mobility stations started. Regarding the emissions of NO₂, CO₂ and PM, statistics showed that the implementation of mobility stations led to a strong decrease of all three factors of emissions for users of mobility stations. Also, it can be seen that users of mobility stations have significant lower

Outlook

The City of Munich plans a city-wide implementation of the concept of mobility stations. The mobility stations are easy to upscale because there are already four mobility stations which have been implemented in Munich's CIVITAS ECCENTRIC Living Lab as well as investment and operational costs can be numbered quite precisely. Further promoting and upscaling of mobility stations could have a long term impact regarding lowering emissions and promote a mode shift. Residents might become more familiar with the sharing concept and use the shared vehicles more often. ●



Let's make Covid-19 a green stepping stone

By Morten Helveg Petersen, MEP, Denmark Renew Europe

We cannot allow ourselves to pause the green transition because of Covid-19. Instead, let us use this crisis as an opportunity to make a green recovery of Europe.



As has already been seen, the Covid-19 pandemic will have an extremely negative impact on the European economy. However, even though the Covid-19 pandemic constitutes an immediate crisis, the climate crisis constitutes an existential threat towards future generations, thus staying the greatest challenge for our generation to overcome.

The decarbonisation of our European economy is a fundamental challenge which we must tackle now. The vast amounts of money which needs to be invested immediately to get the economy back on track should be as green as possible and, at the same time, ensure job creation. I believe that a Green Recovery Plan has the potential of creating millions of sustainable jobs across Europe both on the short and on the long term.

This plan will create local European jobs on the short and medium term by ensuring the green transition and secure the future of the European industry on the long term. Restarting the economy in a green manner will pave the way for necessary changes, allowing us to create much needed jobs while also reaching the goals set at the Paris Agreement.

However, a major challenge for the EU climate change policies in the aftermath of COVID-19 will be to ensure that the clean-energy projects are not delayed too dramatically. The negative effect of low fossil fuel prices could be further magnified

over the short and medium-term, when considering the uncertainty that the clean-energy projects under development are facing over construction schedules, equipment, labour and delivery windows. For example, onshore windmill projects in northern Europe are delayed, and the production of materials such as wind turbines has been slowed down or completely stopped. The outcome of such projects depend very much on the economic recovery – the sooner it starts, the better it will be for clean energy investments.

Let's ride the Renovation Wave

Therefore, one of the main projects would be to start a so-called 'Renovation Wave' which has the potential of contributing significantly to the speeding up of the EU Green Recovery plan. Renovating buildings by focusing on a complete decarbonisation of the heat sector through heat pumps and district heating and cooling (DHC) can improve EU's citizens' quality of living, whilst spurring the use of local renewable energy sources and creating new jobs both in the construction and the energy market. District heating helps reducing our dependency on fossil fuels and increases the security of supply for households as well as member states. It is estimated that 220,000 new and greener jobs could be created between today and 2050 by expanding DHC networks in Europe.

In order to finance this project, we must prioritise investments and

European Funds in renovation and retrofits projects which enable buildings to be Paris-proofed. We need to develop financial and fiscal incentives in order to increase renovation rates and promote deep staged renovation with ambitious energy efficiency goals. Furthermore, the financing of building renovations needs to be prioritised as an economic recovery measure in the new MFF proposal and as a powering factor for the just transition.

Let's go electric

However, the renovation wave is not the only green project which has the potential of considerably contributing to the EU Green Recovery plan. We must also prioritise the electrification of our societies, as it is one of the most cost effective ways of reducing CO₂ emissions. For the areas which electrification cannot cover, such as heavy industry and heavy transport, power to hydrogen may be a solution. We should therefore focus on large scale, multi-linked offshore wind installations and research into large-scale hydrogen and green fuel production. This could be a common offshore wind project which would supply green energy to the markets of multiple member states.

Consequently, we should also continue to develop the storage capacity of excess renewable energies and its conversion into other energies for different sectors, such as power to hydrogen. For this to make sense, it is essential that the energy needed to power these converters

originates from a renewable source and that only Power-to-X technologies which reduce CO₂ emissions should be considered.

Finally, I believe that it is of utmost importance that we invest in Green Mobility on a European scale. Cross-border investments in high-speed trains and the renovation of inter-city rail networks would also create new jobs, boost the European industry, and reduce emissions from the transport sector. Moreover, it is also important to promote green mobility by investing in better infrastructure such as more widespread charging stations. Investing in green mobility would have a positive effect on employment since, based on a moderate uptake of plug-in vehicles of approximately 35%, 200,000 jobs would be created before 2030.

As a result, it is important, considering the economic impact the COVID-19 crisis will have on the EU Member States, to focus on effective ways of restarting our economies. However, it is also a unique opportunity to change the ways our economies function for the better, by focusing on a more sustainable industry, thus helping us reach the goals set by the European Green Deal.

It is imperative to grab this chance and initiate these projects as soon as possible in order to save our businesses but also our planet, while creating as many sustainable jobs as possible for European citizens. ●

The iBRoad concept for Building Renovation Passports after COVID-19

By Alexander Deliyannis, Sympraxis Team, iBRoad project coordinator

How is the iBRoad project, a finalist for the EU Sustainable Energy Awards in the Innovation category, and its vision for stepwise deep renovation of European buildings relevant in the current context?

The COVID-19 pandemic and related lockdowns saw European homes transformed – literally in a matter of days – into hubs for a multitude of concurrent activities extending way beyond the dwellings' original intended purposes, such as work, education, physical training and cultural creation. This instant change made even more evident the need for buildings to be safe, comfortable, climate-proof and resilient, while making efficient use of resources to cater for all EU citizens' needs.

While the context of this transformation may have been perceived as temporary, we can be certain that it will continue beyond the pandemic framework, at least to a significant degree. Indicatively, according to recent research by Gartner, 74% of CFOs intend to permanently shift some employees to remote work. Other professionals, including many currently unemployed, may choose to develop new careers from their homes.

Overall, it is reasonable to expect

that people will be spending more time in their homes than before the pandemic; they will thus want to improve conditions such as thermal comfort, ventilation, noise insulation, lighting and room flexibility for new activities. Research has shown that people are happier and more productive in settings which they themselves have shaped and can control.

It is also reasonable to expect that many of those improvements will be done gradually due to



cash shortages. This is not a new phenomenon. We know that most home building renovations in Europe are already implemented step-by-step; they are also mostly funded by homeowners themselves. A key element of these renovations is that they may not always be named or perceived as such; they may be called ‘interventions’, ‘improvements’, ‘redecorations’, ‘works’, ‘maintenance’, ‘upgrades’ or otherwise.

Notwithstanding, they represent substantial investments in European dwellings, gradually changing the residential building stock, in and out.

Before COVID-19, a major incentive for such investments, particularly in Southern Europe, was their exploitation in the sharing economy. This is now not the case, with other trends taking precedence, such as those mentioned above. An eminent danger here are ‘quick fixes’ that reduce future options or make them much more expensive.

At the same time, the urgent and cross-cutting nature of the pandemic in no way reduces the urgency and importance of climate change; the EC’s recent announcement of the recovery plan and the role of the European Green Deal sets the full context. The climate-related requirements for European buildings are more important than ever, in respect to both climate change mitigation (reducing buildings’ direct and indirect greenhouse gas emissions) and adaptation (providing climate-resilient shelter).

What if all these investments in a home could be put into a greater context and be part of a consistent while flexible long-term plan, leading to a building which is better in all respects, including climate resilience, indoor environment, energy performance, economic viability and aesthetics?

It is here that the joint concept of building renovation roadmap and

digital building logbook proposed by the iBRoad project, as a model for Building Renovation Passports, comes into play: the roadmap can be used to transform the homeowner’s desires into a concrete long-term plan, while the digital logbook can help them organise all building-related information and record their progress along the plan as snapshots of real building states.

The iBRoad project began before Building Renovation Passports were mentioned in the Energy Performance of Buildings Directive (EPBD), but its approach fully supports the EPBD context: the iBRoad concept is aimed as a catalyst for deep renovation of residential buildings, providing realistic roadmaps which take into account homeowners’ needs, desires and financial means. If use is made of loans or grants supporting building renovation, these too become part of the plan.

The iBRoad approach includes several other elements and methodologies in support of stepwise deep renovation, such as an energy audit methodology and training leading to the development of the roadmap; a flexible hybrid data structure for building information (common and country-specific); a cost calculation methodology; public opinion and stakeholder feedback analysis; and policy proposals including guidance for implementation and suggestions for informational, economic and regulatory instruments surrounding Building Renovation Passports. These outcomes are publicly available and form part of a modular framework: authorities and agencies can choose

the elements which are relevant to their own specific conditions.

Critically in the current context, the iBRoad roadmap-logbook approach could also support non-energy related home transformations. Home renovation ‘triggers’, such as children moving out, providing working space, or undertaking major maintenance works represent opportunities to reflect on the big picture of our home’s mid-term and long-term future. A key aspect is avoiding lock-ins, whereby present choices limit the renovation potential in the future. Conversely, known ambitions for the future can be more efficiently and effectively implemented if already foreseen in planning. A building renovation roadmap can ensure that the best measures are taken in an optimal order.

iBRoad’s end-user survey showed that, while most homeowners are willing to undertake the cost of renovation themselves, they may be reluctant to invest in expert guidance, such as that provided by a Building Renovation Passport. Yet such guidance may be critical for the long-term success of renovations, both for homeowners needs and policy targets. This is therefore the opportunity for the public sector in EU Member States to invest in Building Renovation Passports, thus supporting citizens in doing their part for social, economic and climate resilience. It is also the opportunity for the public sector to take advantage of such instruments for its own ‘homes’ – public buildings are ideal candidates for stepwise deep renovation. ●



The iBRoad project has received funding from the European Union’s HORIZON 2020 research and innovation programme under grant agreement No 754045.

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Energy efficiency: green recovery ‘made in Europe’

By Monica Frassoni (pictured), President of the European Alliance to Save Energy



The Covid-19 pandemic is highly impacting our societies and is a major shock for the European and global economy. In this difficult context, the European Union has the opportunity to relaunch its economy guided by its long-term climate commitments, namely becoming climate neutral by 2050, while at the same time providing support to its many citizens who suddenly lost their work and income.

The recovery packages being prepared should not only aim at countering the economic damage caused by the COVID-19 pandemic. They should prepare the ground for a more prosperous, resilient, and sustainable future for our continent and the world.

Energy efficiency can help policymakers address the multiple challenges we are all faced with.

Energy efficiency is paramount for climate mitigation. Through existing technologies, it is possible to reduce energy consumption, increase the efficiency of the entire energy system and accelerate the integration of renewables. According to the International Energy Agency (IEA), 76% of the European greenhouse gas emission reductions required to keep temperature increases below 1.5°C must come from energy efficiency.

In the European Union, energy efficiency is one of the pillars of the European Green Deal. In the recent proposal of a European Climate Law, energy efficiency is part of the defining elements of the EU's trajectory towards climate neutrality

by 2050. Along the same lines, the current political focus on buildings renovations indicates that the EU institutions recognize the economic, social and environmental impact of a transition towards a highly efficient building stock. Last but not least, the European Commission recently highlighted in its EU Industrial Strategy that reducing emissions across industry, namely the most energy-intensive ones, will greatly depend on the wide implementation of efficiency measures and on the Energy Efficiency First principle.

When it comes to industrial strategy, economic growth and job creation, indeed, the full application of the Energy Efficiency First principle to all energy policymaking, planning and investments, can be a real change maker for the energy efficiency value chain and, as a consequence of this, for the European economy.

Our continent hosts some of the most innovative and successful energy efficiency companies in the world. The members of the European Alliance to Save Energy are global “champions” that export technologies and drive innovation. Hundreds of other players, especially SMEs, operate in this field across Europe.

Therefore, it is not surprising that the International Patent Classification green patents inventory of the World Intellectual Property Organization shows that among the countries with higher concentration of filing of patents in energy conservation technologies there are EU Member States such as Germany, France, and the Netherlands. In addition, the filing of energy conservation technologies patents (together with green transportation technologies) continue to grow despite the slowdown of other green patents technologies.

This demonstrates that the energy efficiency value chain is very much European. Therefore, investing in it will produce deep benefits in and contribute to stimulating the whole European economy.

Moreover, energy efficiency has a clear impact on local value chains, and it has the advantage of being “ready to use”. A key example is given by the building renovation value chain. This is made of several sectors and professionals which are all needed to implement projects that can be started right away. This kind of investments are extremely useful to boost local economies after a shock like the current crisis. In addition, they

are much safer than building high-cost alternative energy infrastructures which may lock-in investments for years and waste taxpayer’s money in stranded assets. Finally, this kind of investments will foster the creation of high-quality jobs, in an innovative and digitalised environment.

For these reasons, in an increasingly competitive global market where the European industry struggles to remain a leader, energy efficiency is a strategic way forward. This should be reflected in how strategic value chains and priority infrastructures are defined and selected at EU level. For example, through changes to the energy infrastructure governance in the revision of the TEN-E regulation, and by including a predominantly European energy efficiency value chain in the Important Project of Common European interest (IPCEI).

For Europe, investing in energy efficiency means investing in a sustainable recovery which is ‘made in Europe’. We can capitalize on this added value to achieve a fast, smart, and environment-friendly recovery while boosting long term competitiveness of a broad range of European sectors and industrial players. ●

“ Our continent hosts some of the most innovative and successful energy efficiency companies in the world. ”

Reigniting Europe's economy with the cleanest electricity in history

By Kristian Ruby (pictured), Secretary General of Eurelectric

A deep recession is starting to materialise as the COVID-19 outbreak has locked down global economies. Value chains were severely disrupted by protracted shutdowns, travelling restrictions or the necessary health and safety measures. Europe aches for an ambitious green recovery plan that simultaneously tackles the dire economic and social consequences, while driving forward the carbon neutrality efforts.

The power sector has an enormous potential to reignite the economy, and can deliver positive effects to connected sectors, such as automotive and buildings.

For instance, enabling the deployment of EV charging infrastructure could revive local manufacturing capacities and create jobs. Moreover, this infrastructure will be necessary for sustainable recovery of the automotive sector.

Green recovery programmes to enable the renovation and electrification of buildings is another area with potential. Today, 75% of Europe's buildings stock is not energy efficient. Such programmes could help create about 1.4 million local jobs.

Keeping the lights on
2020 brought uncertainties and

challenges on multiple levels. In March and April, electricity demand dropped significantly across Europe, even up to 20-30 % in Italy and Spain. By the end of the year, Europe is likely to witness a 6 to 10 % fall in the total energy demand. Such a decrease is a symptom of a limping economy in need for sustainable instruments to recover rapidly.

Despite these uncertainties, the European power sector has proven to be a reliable and agile partner for consumers and authorities alike. Fears of blackouts were rapidly dispelled as companies, within the flick of a switch, moved into crisis operation mode and ensured the

continuity and security of electricity supply. To name a few:

In Austria, 53 employees were isolated inside a power plant for several weeks, to maintain operations while avoiding any contamination. In the Czech Republic, electricity utilities guaranteed free backup generation for hospitals. In Romania, distribution operators addressed the urgent issues of over 150 consumers diagnosed with the coronavirus. Last but not least, moratoria on bills, payment deferrals or other financial arrangements to support consumers were announced in most European countries.

Utilities have seen a significant impact on their revenues. Their balance sheets have been impacted by the drop in electricity demand, coupled with the break on bills and plunging electricity prices.

This year, the capital expenditures of utilities are expected to fall by up to 15%. Due to liquidity constraints companies are likely to use their budgets cautiously. The existing resources would rather be dedicated

to maintaining current operations, than the launch of new projects.

What is certain? The choices made now will shape our society for decades to come. Therefore, climate ambition and the energy transition plans must not be put on the back burner if we want to avoid another economic shatter.

Generation mix in full transformation

During the first part of 2020, we have seen significant transformations in the energy mix. On one hand, we have seen a progressive fuel switch. Coal output decreased substantially across Europe. In the UK for instance, coal-fired power plants were idle for almost the entire month of April. Overall, generation from coal fell by 27.5 % in the first four months of the year – when compared to the same period last year.

At the same time, renewables covered more than 40% of the electricity generation, with favourable weather conditions and more capacities coming online. Their share in the mix must continue to grow to deliver on

the deep decarbonisation ambitions.

Delivering on the political targets will require between 350 GW and 400 GW of additional renewable energy capacities in the coming 10 years, a huge challenge. On the other hand, the stimulus packages and recovery programmes put forward by governments are once-in-a-generation opportunity to invest in the future. So let go ahead and seize it. ●



DRIVE unlocks DR potential and de-risks implementation

Uncontrolled overproduction from distributed renewables can cause grid issues at all levels. This is one of the key challenges of the energy transition, and unlocking flexibility via demand response (DR) is critical to this. In particular, unlocking the distributed flexibility potential in medium and low-voltage grids will be important, which has little precedent in the market to date.

To address this, the H2020 DRIVE project has developed a full-fledged platform for seamlessly connecting distributed assets within a single environment. Validation is performed through pilot demonstrations ranging in all stages of the energy-value chain, from large-scale generation plants to residential community and tertiary buildings. A key piece of this validation is digital-twin and control hardware in the loop (C-HIL) testing, which accelerates implementation by directly addressing integration issues and providing early validation before beginning costly physical tests. As the project closes its final stage of validation, the first results already show significant potential to unlock flexibility from generation assets.

The Giessenwind demonstration site, featuring transmission lines, a transformer station and battery storage for excess energy from wind generation, has provided an excellent opportunity to benchmark and validate the potential flexibility available from voltage control, frequency control testing and congestion management actions via this single platform approach. Results from frequency containment reserve and Congestion Management tests show that current equipment can utilize these algorithms, significantly reducing the need for new CAPEX installations for grid reinforcement by as high as 20%.



This approach has also simplified the integration stages of these algorithms. During the model validation process with the digital twins, bugs in MODBUS maps and other communication issues can and have been identified quickly and repaired; issues that could significantly harm physical equipment if deployed directly to the devices. This improves scaling capacity in a low-risk setting, minimizing the risks that real devices may face due to human errors.

In addition to the direct energy savings results, easy and reliable virtual testing procedures allow for extreme scenario and future capability testing that would otherwise not be cost-effective in physical testing.

In the Giessenwind site, this included analyzing the effects of islanding and highly irregular frequency scenarios. C-HIL Digital twins have already proved important in applications at other demonstration sites as well, with the results of full algorithm validation tests on Time of Use Energy Bill optimization and Max Power Consumption, serving as a critical step in assuring building managers

and owners that new control actions perform as intended and won't negatively impact existing systems.

The tests at Giessenwind have shown that by using digital-twin C-HIL validation, novel DR capabilities can be tested in a low-risk setting earlier in the production process, saving time and potentially dangerous risks associated with physical piloting. Scenario validation with digital twins is an excellent means to safely gather information on system performance for new applications with little precedent in the existing market. Such tests are currently also being performed for residential and tertiary building applications. ●

More info at:
<https://www.h2020-drive.eu/>

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This project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement n° 774431

ETU initiative

Encouraging local energy communities in island and rural areas

By Cynthia Echave and Danilo Ceh

What is the ETU initiative?

The Interreg Med Renewable Energy Community Project is a transnational cooperation project that proposes and launches the ETU (Ecosystemic Transition Units) initiative as a capitalisation strategy for **transferring** the outcomes from Interreg MED Projects dedicated to renewable energies and also for **promoting** an energy transition model based on a holistic approach to the territorial, economic and social needs of rural areas. The MED Renewable Energy Community consists more than 110 institutions within 57 regions in 10 EU Member states and 3 neighboring countries, all located in the MED territory.

The ETU initiative aims to encourage local authorities and civil society to use the ETU toolbox and ETU model in their energy transition plans. The ETU toolbox gathers the main technical outcomes and tools developed from the MED Renewable Energy Community and is open to gather other tools that complement the support to energy planning, the creation of energy communities, energy policies and smart solutions for energy facilities.

The ETU model offers a roadmap for rural **areas** addressing 5 main concerns: 1) apply an **ecological approach** to climate emergency; 2) promote a **territorial equity** between the urban and the rural, 3) boost **social innovation** through technology and warranty clean energy for vulnerable groups, 4) encourage the **green economy** by attracting green businesses into local energy communities, and 5) advocate for the **cooperation & commitment** between key actors and key policy frameworks.



The contribution of Interreg Med Renewable Energy Community Project will be the integration of energy transition strategies from a holistic perspective that allows guiding decision-making to enhance a better territorial, social and economic development of the territories.

The Interreg Med Renewable Energy Projects' main targets are the island and rural areas of the Mediterranean Regions, precisely because of their high vulnerability to climate change, and the emergency actions that small villages/island should take with the scarcity of resources.

The main contribution of the project to increasing local RES production and consumption in island and rural areas will be to support the application and use of ETU toolbox and ETU model in energy planning, through sectoral plans; energy communities through citizens' awareness of energy transition; energy governance through the implementation of green fiscal

policies; and energy facilities through the design and implementation of microgrids, storage systems, PV Solar, etc.

Energy transition can be a catalyst of revitalization into a greener and more resilient pathway. The project wants to highlight the gaps and opportunities that exist, in order to focus efforts into bringing solutions for rural needs.

How to support the ETU initiative?

The project calls on local authorities to join the ETU initiative in order to integrate its toolbox and model into their energy transition plans. We are looking into small villages and rural areas located either inland or on islands in the Mediterranean region.

We invite you to support the ETU initiative by signing our **Manifesto** and to contact us in case you are interested in receiving further information about our activities. More: <https://renewable-energies.interreg-med.eu> ●

Turning the energy system upside down

How consumers are leading the energy transition

By Frauke Thies, Executive Director, smartEn



The ongoing COVID-19 crisis is creating shockwaves across Europe and the world. While the containment of the coronavirus is obviously at the top of the agenda, the crisis is already leading to profound economic and societal consequences.

As the economy is projected to experience one of the most significant downturns in history, investments in a sustainable recovery move to the centre of attention. The distancing measures following the outbreak of the pandemic have also reinforced other trends already in motion, including the exploration of new digital solutions. It also shines a new light on questions of resilience and robust supply chains. Finally, the current health crisis is a sharp reminder that Europe cannot afford to delay necessary action in the face of an imminent climate crisis, both for the safety of its citizens and the health of its economy. This

is not the time to delay the clean energy transition, but an opportunity to invest in driving it forward, thus ensuring that Europe is more resilient and competitive in the future.

Europe's decision-makers have rightly recognised the efforts for recovery as an opportunity to speed up the Green Deal for Europe. The energy sector offers a myriad of solutions, very much in line with the trends emerging from the current crisis as described above. Technology developments for renewable energy generation, storage and demand response, sector integration with the strategic electrification of transport, buildings and industrial processes, and the emergence of new business models together can provide answers to current challenges of sustainability and resilience in the field of energy.

The success of Europe's clean energy transition will depend on all these different solutions working together in an efficient way. European energy users - businesses and citizens alike - hold the key to this. They can drive investments in sustainable technology, while providing important flexibility to stabilise the energy system, creating a broad acceptance in society, and ensuring affordability of the transition in times of crisis.

Driving Investments

Prosumers are already driving investments in clean and smart energy technologies. For companies, on-site generation of renewable energy and green energy procurement have become important investment areas. Over the last five years, 8GW of

new renewable energy sources have been contracted in Europe through corporate renewable power purchase agreements (PPAs) and at least another 10GW has been installed onsite.¹ Likewise, private citizens play an increasing role through investments in renewables, storage and complementary technologies on site, or participation in community projects. It is estimated that by 2030, energy communities could own up to 20% of wind and solar capacity in Europe, and by 2050 more than 185 million EU households could contribute to demand response, storage and renewable energy production.²

Flexibility for a Resilient Energy System

Crucially, energy users can provide significant amounts of flexibility that is indispensable for an efficient and secure energy system. In a system based increasingly on renewable energy sources, variability is putting pressure on the stability of supply. Trying to resolve this challenge entirely with power generation capacity would not only pose a massive infrastructural challenge, but it would also mean that plants stand idle for large amounts of time, leading to massive costs for European consumers. On the other hand, flexibility from storage and demand response can provide efficient alternatives. A very substantial amount of industrial processes, commercial buildings, private homes and electric vehicles can be operated flexibly with only very limited investments - typically by help of technology automation and

aggregation services. The European Commission has assessed the potential of flexibility from demand response alone to be 160GW by 2030 already. This number will grow further thanks to sector integration, which will further include flexibility potentials from the operation of electric vehicles, heating & cooling and industry.

- At the end of 2018, more than 1 million passenger cars on Europe's roads were already electric.¹ Supported by smart charging infrastructure, **electric vehicles** can transform from mere transport assets to decentralised energy resources;
- The number of **smart homes** in the EU is expected to increase tenfold in the coming years: homes which can use digitally controlled lighting, heating, ventilation, air conditioning, security and home appliances will increase from 8.5 million in 2016 to 80.6 million in 2021.¹
- **Non-residential buildings** make up 30% of the total energy consumption throughout Europe.¹ The implementation of the existing European policy measures on Building Automation and Control Systems (BACS) will not only save 14% of total building primary

energy consumption by 2038, but these systems also enable the flexible operation of buildings in response to system signals.¹

- Digitalisation and automation of **industrial processes** is already turning these energy users into flexibility resources. The current potential of the European energy intensive industry alone is estimated at 16GW.¹

Societal Support and Affordability

Finally, the involvement of businesses and citizens as active participants in the transition will boost societal support. If consumers are encouraged to contribute their resources and flexibility, they will not only show commitment and gain value through direct earnings or reduced energy bills, but they will also reduce costs for the system at large.

The reliance on flexible and decentralised resources can reduce the cost of an increasingly decarbonised energy system by multiple billions of euros across the continent.⁴ A consumer-driven energy system thus benefits all users.

Millions of businesses, buildings, homes and cars across the continent represent crucial drivers for a sustainable, efficient and resilient

energy system. Especially in the context of the COVID-19 crisis and its aftermath, Europe has the opportunity benefit from the massive value that consumers can bring to the energy system and its clean transition.

Any recovery measures can support this by focussing on the roll-out of smart technology solutions – whether for the smart use of energy in buildings or electric vehicles. The underlying regulatory challenge is in providing full market access for industrial, commercial and private consumers and their energy solutions, and enabling revenue streams that reflect the actual contribution consumers make with their decentralised resources. ●

smartEn is the European business association integrating the decentralized solutions of the clean energy transition. Its aim is to create opportunities for every company, building and car to support an increasingly renewable energy system.

¹ Resource Platform 2019 (<http://resource-platform.eu/files/toolkit/RE-Source-introduction-to-corporate-sourcing.pdf>, <http://resource-platform.eu/wp-content/uploads/files/downloads/RE-Source-Platform-Policy-Recommendations.pdf>)

² European Commission 2016: Impact Assessment on Renewable Energy Sources; CE Delft (2016), The potential of energy citizens in the European Union

³ European Commission Impact Assessment accompanying the proposals for the Electricity Directive and Regulation, 30 November 2016

⁴ See e.g.: Imperial College London/NERA Economic Consulting 2015: Value of Flexibility in a Decarbonised Grid and System Externalities of Low-Carbon Generation Technologies - For the Committee on Climate Change

FUDIPO

Industry 4.0

SPiRE FUDiPO



FUDiPO is a project funded by the European Commission under the H2020 programme, SPiRE-02-2016: “Plant-wide monitoring and control of data-intensive processes”, which started on October 1st, 2016 and ends on 30th September 2020. The project is coordinated by Mälardalen University, and the consortium is composed of energy experts, applied mathematicians, and software engineering experts to face the SPiRE topic. The process industry needs solutions to reduce operating costs, environmental performance footprint and quality of the products. Thus, **FUDiPO** is developing and testing (in five case studies) advanced dynamic physical (complemented with soft sensors) and statistical models, like Bayesian networks and machine learning models, to form advanced diagnostic, decision support, optimization and model predictive control. The system developed will optimize all levels in a factory, integrating the different control levels from the separate production units to mill level by building blocks. Thus, the project aims energy and resource savings as well as better environmental performance in EU industries. The developed system is implemented in full-scale, and validated in five case studies:

Oil refinery (Tüpras)

Problem: Diesel is produced in a unit where focus is increased production within European standards for distillation point, S content, flash point, etc., whose variation is unmeasured.

→ **FUDiPO**: the project brings better process control, reducing give-away product below or above European limits.

Large heat and power plant (Mälarenergi)

Problem: The heterogeneity of the waste used for cogeneration plant

causes operational problems and challenges in emissions control.

→ **FUDiPO**: will improve the control, decreasing downtime, fluctuations, corrosion, fouling and agglomeration.

Waste-water treatment plant (ABB)

Problem: the aeration demand constitutes 50% of the electric energy demand.

→ **FUDiPO**: development of control algorithms for a better performance, measuring quality of incoming waste

Pulp and paper industry (Billerud-korsnäs)

Problem: the plant has three fiber lines with different pulp qualities. The most important parameter is Kappa

number, which measures how much lignin is left in the pulp after the digester, and whose control is difficult.

→ **FUDiPO**: more stable process and fault diagnostics due to better control of Kappa number

Micro heat and power turbine (MTT)

Problem: the Total Cost of Ownership of the EnerTwin, as for all CHP systems, heavily depends on the maintenance cost. To reduce these even further improvement of the diagnostics and decision support for installers is needed.

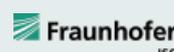
→ **FUDiPO**: increasing efficiency by supporting-clients by developing condition-based preventive maintenance and planning. ●

FUDiPO Toolbox

In the FUDiPO project one platform with primarily commercial software and one with open source software have been developed. In the open source software, the user does not need to pay any license fees, but does not get support to adjust codes or improved functions, which the commercial suppliers can give, but to a specified cost. In both cases new AI functions are continuously added. This includes ANN (artificial Neural nets), BN (Bayesian nets), PLS models and other regression models, multi-variate analysis, ML (machine learning), and simulation tools like Open Modelica for building physical models for any application.

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme Under Grant Agreement No 723523



SUSTAINABLE ENERGY WEEK

An initiative
of the  European
Commission

22-26 JUNE 2020

EU SUSTAINABLE ENERGY WEEK

BEYOND THE CRISIS:
CLEAN ENERGY
FOR GREEN RECOVERY
AND GROWTH



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SUSTAINABLE ENERGY WEEK

An initiative of the  European Commission

Organised by the European Commission, **EU Sustainable Energy Week (EUSEW)** is the biggest annual event dedicated to renewables and efficient energy use in Europe. The 15th edition of EUSEW will take place on **22-26 June 2020**, under the theme: **'Beyond the crisis: clean energy for green recovery and growth'**.

EUSEW 2020 registration is now open! In the lead-up to the event, don't miss these highlights:



Register to the Policy Conference (23-25 June)

Choose from **30 digital sessions**, gathering industry experts and policy makers to discuss various aspects of the **European Green Deal and a green recovery**.

Sign up for the first ever European Youth Energy Day (22 June)

Are you aged 18-30 and want to help make the European Green Deal a reality? Sign up **before 12 June** and share your vision on how transform Europe into the first climate-neutral continent.



Cast your vote for the EUSEW Citizens' Award (until 15 June)

Find out who takes home the prize on 23 June, along with awards for **Youth, Engagement and Innovation**, outstanding **Women in Energy**, and the **Eastern Partnership Award**.



Organise an Energy Day

Digital events will take place all over Europe, engaging local communities **throughout June**.

22-26 JUNE 2020

EU SUSTAINABLE ENERGY WEEK

BEYOND THE CRISIS: CLEAN ENERGY
FOR GREEN RECOVERY AND GROWTH

#EUSEW2020

FOREWORD BY COMMISSIONER FOR ENERGY KADRI SIMSON

Dear EUSEW participant,

I would like to welcome you to the 15th edition of the EU Sustainable Energy Week (EUSEW) – the biggest conference dedicated to renewable energy and efficient energy use in Europe. Since 2006, EUSEW has been the flagship event bringing together stakeholders in the European sustainable energy sector, and this year's edition aims to reach the same heights, **for the first time in digital format**.

The European Commission has just put forward its proposal for a historic **recovery package** and, together with the **European Green Deal**, it will guide our steps as we fast-forward the transition to the climate-neutral economy for 2050. EUSEW 2020 will contribute to this effort by showcasing how EU energy policy can drive the green recovery and growth that we need. Thus, the theme of this year's edition is **'Beyond the crisis: clean energy for green recovery and growth'**, with discussions focusing on boosting buildings renovation, accelerating renewables development, and promoting innovative clean energy technologies, among other topics.

The main programme will feature a three-day high-level Policy Conference (23-25 June) and the first ever Youth Energy Day (22 June), a youth dialogue with Executive Vice-President Frans Timmermans on how to transform Europe into the first climate-neutral continent. The main programme will be complemented by an extended series of side events and digital sustainable energy events across Europe in June.

The best sustainable energy projects and outstanding women in energy will be honoured at the coveted Awards Ceremony (23 June). Nine European projects have been shortlisted as the year's most successful for clean, secure and efficient energy. A high-level jury will decide the winners in Youth, Engagement, and Innovation categories. A public online vote will determine the winner of the 2020 Citizens' Award. An additional public online vote will also decide the winner of the second Eastern Partnership Award. I encourage you to have a look at these inspiring projects and vote for your favourites!

I look forward to your participation in order to make the 15th EU Sustainable Energy Week a great success. I am confident that the discussions and exchanges that will take place will bring forth new ideas, help spread innovation and best practices, and foster cooperation and partnerships – thereby further cementing Europe's role as a leader in the global energy transition.





OPENING SESSION

The inauguration of the first-ever digital EU Sustainable Energy Week will be moderated by **Karen Coleman, an award-winning Irish journalist**. She will be joined by high-level keynote speakers to open the Policy Conference and present the overarching theme 'Beyond the crisis: clean energy for green recovery and growth'.

EU SUSTAINABLE ENERGY AWARDS

Winners will be announced during a live, online Awards Ceremony, chosen from each of the three categories – **Innovation, Youth, and Engagement**. The year's ceremony will also highlight awards for **Women in Energy**, the **Eastern Partnership Award** and the **Citizens' Award** (public vote closes on 15 June).

DEBATE WITH AMBASSADORS

An interactive and dynamic exchange, following the Opening Session and Awards Ceremony. The moderator, **Hans van Steen, Acting Director on Renewables, Research and Innovation, Energy Efficiency (DG Energy, European Commission)**, will invite EUSEW Ambassadors to discuss their commitment to, and support for, the European Green Deal and highlight the road to green recovery and growth. The discussion will be followed by a Q&A with the online audience.

DAY 1 23 JUNE 2020	
08.30 ▶ 09.00	WELCOME
09.00 ▶ 09.30	OPENING SESSION
09.30 ▶ 10.30	AWARDS CEREMONY
10.30 ▶ 11.00	COFFEE BREAK
11.00 ▶ 12.30	DEBATE WITH AMBASSADORS
12.30 ▶ 14.00	LUNCH
14.00	● STRATEGY
14.30	<ul style="list-style-type: none"> ● RENOVATION WAVE Boosting the European Green Deal renovation wave ● RENEWABLES An offshore renewable energy agenda for the European Union ● ENERGY TRANSITION Energy transition towards climate neutrality: the EU's support for clean energy technologies and innovation
15.00	
15.30	COFFEE BREAK
15.45	COFFEE BREAK
16.00	<ul style="list-style-type: none"> ● SECTOR INTEGRATION Smart sector integration of gas and electricity infrastructure – opportunities and challenges in the context of the EU Green Deal ● STRATEGY Climate Pact and Multilevel Climate and Energy Dialogues – get involved! ● ENERGY TRANSITION EU Green Deal & the ways out of the COVID-19 crisis: a high-level debate about the greening of the EU recovery
16.15	
17:30	
17:45	

EUROPEAN YOUTH ENERGY DAY

Young EU citizens will take centre stage at the first ever European Youth Energy Day to share their vision on how to transform Europe into the first climate-neutral continent. The most innovative and thought-provoking ideas will be presented to **Frans Timmermans, Executive Vice-President for the European Green Deal at the European Commission**.

DAY 2 24 JUNE 2020			DAY 3 25 JUNE 2020		
<ul style="list-style-type: none"> ● FINANCE <p>Unlocking private financing for energy efficiency investments: gearing up to support the European Green Deal</p>	<ul style="list-style-type: none"> ● JUST TRANSITION <p>Decisive action on energy poverty: solutions from across the EU</p>	<ul style="list-style-type: none"> ● STRATEGY/LOCAL AUTHORITIES <p>The role of local authorities in a fair energy transition, through retrofitting buildings</p>	<ul style="list-style-type: none"> ● FINANCE <p>New instruments to support a green recovery in Europe: the modernisation and innovation funds</p>	<ul style="list-style-type: none"> ● ENERGY TRANSITION <p>Women in the energy transition</p>	<ul style="list-style-type: none"> ● RENOVATION WAVE <p>Spurring Europe's renovation wave – how #BetterBuildingsEU can contribute to #EUGreenRecovery</p>
COFFEE BREAK			COFFEE BREAK		
<ul style="list-style-type: none"> ● FINANCE <p>Cities driving the green recovery: boosting investments for local actions</p>	<ul style="list-style-type: none"> ● RENOVATION WAVE <p>Renovation wave: transformative actions towards carbon neutrality</p>	<ul style="list-style-type: none"> ● ENERGY TRANSITION <p>Clean.Competitive. Connected: how to successfully design smart sector integration in the twin climate and digital transition</p>	<ul style="list-style-type: none"> ● FINANCE <p>Effective home renovation programs to stimulate the post-COVID-19 recovery</p>	<ul style="list-style-type: none"> ● RENEWABLES <p>A robust solar and wind industrial base, underpinning the European Green Deal</p>	<ul style="list-style-type: none"> ● ENERGY SYSTEMS <p>Smart grids and flexibility markets: status of demonstrators and effect of COVID-19 on the demo operation and results</p>
LUNCH			LUNCH		
<ul style="list-style-type: none"> ● FINANCE <p>LIFE clean energy transition: boosting a new LIFE after the crisis</p>	<ul style="list-style-type: none"> ● ENERGY TRANSITION/SUFFICIENCY) <p>Energy sufficiency, a game changer to achieve resilience and sustainability after the crisis</p>	<ul style="list-style-type: none"> ● SECTOR INTEGRATION <p>Energy system integration: powering a climate-neutral economy</p>	<ul style="list-style-type: none"> ● FINANCE/HYDROGEN <p>Hydrogen: fuelling Europe's energy revolution</p>	<ul style="list-style-type: none"> ● ENERGY SYSTEMS <p>Flexibility: the invisible infrastructure for a sustainable society? Future market designs and regulatory hurdles</p>	<ul style="list-style-type: none"> ● STRATEGY/NECPs <p>European Green Deal – NECPs at your service!</p>
COFFEE BREAK			COFFEE BREAK		
<ul style="list-style-type: none"> ● SECTOR INTEGRATION <p>Sustainable batteries: an ally for the green recovery</p>	<ul style="list-style-type: none"> ● ENERGY COMMUNITIES <p>Empowering consumers through energy communities</p>	<ul style="list-style-type: none"> ● FINANCE <p>Unlocking investment through climate advisory by the European Investment Advisory Hub</p>	<ul style="list-style-type: none"> ● JUST TRANSITION <p>How can Central and Eastern Europe and the Western Balkan transition to a zero-carbon economy after the COVID-19 crisis?</p>	<ul style="list-style-type: none"> ● INDUSTRY <p>Towards carbon neutrality in a thriving EU industrial sector – markets, investment and financing</p>	<ul style="list-style-type: none"> ● TRANSPORT <p>Boosting the hydrogen economy through international cooperation</p>

NETWORKING OPPORTUNITIES

On the EUSEW digital event platform, participants have the opportunity to meet other participants via 1:1 video meetings and share their interests with fellow professionals and enthusiasts alike.

22-26 JUNE 2020

EU SUSTAINABLE ENERGY WEEK

BEYOND THE CRISIS: CLEAN ENERGY FOR GREEN RECOVERY AND GROWTH

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SUSTAINABLE ENERGY WEEK

An initiative of the  European Commission

Every year the European Commission recognises the most outstanding individuals and projects for their innovation in the energy sector and renewables. This year, the **EU Sustainable Energy Awards** will be live-streamed via the event's online platform.

Tune in on **23 June** to hear the winner announcements in real time! This year, nine finalists will compete in three award categories: **Engagement, Innovation** and **Youth**, plus an additional category recognising the achievements of **Women in Energy**.

A special prize, the **Eastern Partnership Award**, will be given to an inspiring sustainable energy initiative in Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova or Ukraine.

In conjunction with the above, people from all over Europe will have the chance to vote for the 2020 **Citizens' Award** (public vote closes on 15 June) by selecting their favourite project from among the finalists.

ENGAGEMENT

Inspiring citizens to play a proactive role in Europe's energy transition

The **cVPP project (the Netherlands)** developed three community-based virtual power plants in **Belgium, Ireland** and **the Netherlands**. The 'Virtual Power Plants' (VPPs) are cloud-based energy management systems that track the production and consumer demand for electrical power. These virtual plants, like village-owned wind turbines or rooftop solar panels, allow the local communities, themselves, to own, control and sell their power via the national or regional electricity grids.

The **Friendly Bill project (Portugal)** is empowering citizens to become more energy efficient by coaching them to better understand their energy expenses. The project has reached a total of 100 000 consumers in Portugal and trained over 308 electricity technicians to help consumers change their energy use habits.

The **CLEAR 2.0 project (Belgium)** is working to change consumers' energy use habits. The CLEAR 2.0 lab tested home-based renewable energy technologies (e.g. solar panel rooftops, heat pumps) for nearly 30 000 households in **Belgium, Czechia, Italy, Portugal, Slovenia** and **Spain**.

INNOVATION

Making the sustainable energy transition a reality for communities all over Europe

The **Remote area Energy supply with Multiple Options for integrated hydrogen-based Technologies project** started in **Italy, Greece** and **Norway**. True to its name, the REMOTE project supports isolated communities to become self-sufficient in energy, while contributing to the EU's renewable energy and climate goals. The project is rolling out its hydrogen and battery-based energy storage technology in test sites. This storage technology works with any source of renewable power, from wind to biomass, and facilitates the storage of locally produced green power.

The **Direct Drive Tidal Turbine project (Ireland)** has made a breakthrough in a cutting-edge technology: tidal energy turbines. In 2016, the D2T2 project installed the world's first offshore tidal device in Scotland. The D2T2 is more efficient, reducing the total costs of producing tidal energy by 30% – explaining why the model is in high demand in international markets. Moreover, D2T2's technology is popular among the local communities because it has no impact on the environment.

The **Individual Building Renovation Roadmaps (iBRoad) project (Greece)** supports single-family households in setting up personalised renovation plans to make smart financial and energy-efficient plans for renovations to improve their home over the next 5-30 years. So far, the iBRoad roadmap and logbook tools have helped 10-15 homeowners in three pilot countries (**Bulgaria, Poland** and **Portugal**) – with a view to being replicated in other countries throughout the EU.

YOUTH

Inspiring young people to take up the challenge and drive Europe's clean energy transition

The **Youth Employment Network for Energy Sustainability in Islands project (Cyprus)** is helping prepare young professionals (25-29 years old) from islands enter the green jobs market or launch a green business. The YENESIS project has engaged over 84 young professionals from islands in **Greece, Croatia, Cyprus, Estonia, Portugal, Spain** and **Italy**, providing training, mentoring and apprenticeships in energy efficiency, renewables, sustainable tourism and mobility.

The **Weltfairsteher project (Germany)** is working with teachers and students to promote sustainability as core part of the German curriculum. The young project team has developed 60 interactive online challenges – available to students of all ages, free of charge – on topics including climate change, energy & mobility, production & consumption, and water. The project has engaged more than 1 800 pupils in science-based challenges, encouraging younger students to develop their own creative solutions for more sustainable living.

The **Fair (FER) Solutions for Better Community project (Croatia)** is helping tackle energy poverty in Zagreb. The FER project has trained engineering students to perform over 100 household audits to identify energy-saving solutions (e.g. installing insulated windows and doors, LED lamps and radiator reflection panels) with savings of around 200 kg CO₂/year, per household, anticipated as a result.

WOMEN IN ENERGY PROFILES

Ada Ámon (Hungary) is head of the newly established climate change department of the City of Budapest and the founder of influential energy think tank EnergiaKlub. After years of convincing policy makers to take sustainable energy seriously, she is now in a position to take on a male-dominated sector and effect change herself. Her think tank is the only Hungary-based NGO that focuses exclusively on energy efficiency, renewables and other areas of climate adaptation (e.g. urban renovation).

Katharina Habersbrunner (Germany) is a project manager and board member of NGO Women Engage for a Common Future (WECF). For more than 20 years, she has dedicated her career to fighting for a socially just transition towards clean, renewable and decentralised energy solutions. Her work has to a great extent focused on setting up energy cooperatives. In 2011, she set up a successful energy cooperative in Germany and is currently responsible for gender and climate projects in, among other international locations, Ethiopia and Uganda.

Sophie Attali (France) has played a critical role in raising consumer awareness of energy efficiency and encouraging manufacturers to improve their products. She is director at Guide Topten, a consumer service identifies the most energy efficient products on the electric appliance market and puts this information online for free. Looking ahead, she sees her role as one of empowerment to help future generations reduce energy consumption.

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EXTENDED PROGRAMME

As we prepare for the main EUSEW 2020 programme, several side events are being organised for June. The extended programme features individual webinars hosted by EUSEW partnering organisations.

Thursday 4 June - 16.00 ▶ 17.00	COVID-19 and renewables: impact on the energy system
Tuesday 16 June - 10:00 ▶ 11:30	Are NECPs fit to deliver the EU Climate Law?
Thursday 18 June - 10.00 ▶ 10.30	Energising the European Green Deal: engaging stakeholders in multi-level governance
Friday 19 June - 09.30 ▶ 11.00	User-centred Smart Energy Systems in real life communities
Friday 19 June - 15.00 ▶ 16.30	New horizons: Europe driving ocean energy development around the world
Monday 29 June - 10:00 ▶ 11:30	Understanding renewable gases, hydrogen and power-to-gas: empowering consumers to make informed choices
Monday 29 June - 15:00 ▶ 16:30	Ocean observation for the Green Deal
Tuesday 30 June - 11.00 ▶ 12.00	Empowering SMEs in the Green Deal for clean energy
June	Investment in clean energy solutions: what do institutional investors and business angels expect from innovators?

	Tuesday 9 June - 09:30 ▶ 11:00		Wednesday 10 June - 14:30 ▶ 16:00
	Do European industry and consumers need decarbonised and renewable gas to achieve carbon neutrality in 2050?		Cities – can we deliver a Green Deal?
	Tuesday 16 June - 10:00 ▶ 12:00		Wednesday 17 June - 09:30 ▶ 11:00
	Energy data at your fingertips?!		Clean energy islands as champions of the green recovery?
	Thursday 18 June - 10:00 ▶ 12:00		Thursday 18 June - 12:00 ▶ 13:30
	Sustainable alternative transport fuels – state of play and prospects for transport decarbonisation		Energy transition: new business models to de-risk investments and kick start the EU building renovation wave
	Friday 19 June - 10:00 ▶ 11:30		Friday 19 June - 14:00 ▶ 15:30
	Energy communities supporting the energy transition		Buildings as Green Deal heroes: delivering on climate, circularity and wellbeing
	Friday 26 June - 10:00 ▶ 11:30		Friday 26 June - 14:00 ▶ 15:30
	Powering the SET plan for the European green recovery		Energy efficiency – unlocking the potential of unused heat & cold in industry
	Monday 29 June - 10:00 ▶ 12:00		Monday 29 June - 14:00 ▶ 15:30
	Creating a digital ecosystem for the energy sector		Towards a fair energy transition: enabling vulnerable consumers to take part in energy communities
	Tuesday 30 June - 09:00 ▶ 10:30		Tuesday 30 June - 10:00 ▶ 11:30
	Cooling down Europe's heating system		Ready, set, market – How to make Smart City Projects bankable in times of COVID-19
	Tuesday 30 June - 15:00 ▶ 16:30		June
	Actions & recommendations: creating a joint vision for PEDs (positive energy districts)		District heating: working towards local sustainable solutions
	Wednesday 1 July - 10:00 ▶ 11:30		July
	Powering energy transition in rural communities through social and territorial innovation		Decarbonising industry – energy and CO ₂ saving potentials in the short and longer term

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MEDIA PARTNERS

The media partnerships of the EU Sustainable Energy Week (EUSEW) are designed to highlight the many elements of the event (policy sessions, networking activities, local events and award-winning projects) that are contributing to this year's theme "Beyond the crisis: clean energy for green recovery and growth". Stay tuned for more information and follow our activities under #EUSEW2020.



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PARTNERS

The partnerships of the EU Sustainable Energy Week (EUSEW) are designed to reach out to organisations that are helping the EU achieve its climate and energy goals. Stay tuned for more information and follow our activities under #EUSEW2020.



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ORGANISE YOUR ENERGY DAY!

Looking to spark a discussion on sustainable energy? Why not organise a digital event on sustainable energy?

Throughout **June**, energy stakeholders in Europe are connecting online to share their ideas on clean and efficient energy by organising Energy Days.

These digital events are the perfect opportunity to engage with your local community and other green changemakers throughout Europe.

Register your event today:

#EUSEW2020
#ENERGYDAYS

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**SUSTAINABLE
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Achieving Paris Agreement: One Covid-19 crisis per year until 2050

By Adel El Gammal (pictured), Secretary-General of the European Energy Research Alliance (EERA), on why post-Covid economic recovery choices will be a defining moment for human society

Just a year ago, I was commenting in the lines of European Energy Innovation, that in spite of the Paris Agreement adopted three years earlier by 196 state parties, the world was on a trajectory towards 3.3°C¹.

With global emissions peaking year after year, it seemed that nothing could stop the world economy to produce more, consume more resources and energy, and emit more GHG.

Not even the most alarming warnings from the global scientific community on upcoming climate crisis and subsequent societal chaos.

What Covid crisis tell us about our societal model

While four months ago, still just a distant virus hitting a then rather unknown Chinese city, the Covid-19 outbreak has now stranded the entire world economy, generating a social and economic crisis never seen since World War II.

The sudden discovery of the dramatic vulnerability of our world economy undoubtedly constitutes a historical and decisive turning point in the evolution of our modern society.

It has irreversibly marked the human collective conscience and will therefore lead to a deep reconsideration of the foundation of our current development model.

From an industrial perspective, a relative de-globalization is expected to take place, lowering offshore dependency, towards a more resilient and distributed production system where strategic supply chains will be progressively re-shored.

From a market perspective, the crisis has demonstrated that Adam Smith's invisible hand was also blind, and it reinstated the essential role of a strong State guaranteeing fundamental public services defined as common goods and therefore preserved from market forces.

From a social perspective, the general response of governments to the Covid-19 crisis has broken a century old universal certitude and has revealed what was unthinkable just few months ago: Governments are able to unlock trillions of € in a snap of the fingers. There is little doubt this sets an irreversible precedent to the evolution of our future societal model.

The Coronavirus pandemic might well distract attention from climate-related longer-term imperatives and shed uncertainty in the coming months on climate related funding at national, EU and global levels.

But it will surely constitute an eye-opener: The frailty of human society and its vulnerability to the much higher threat of Climate Change coupled with the capacity to mobilize

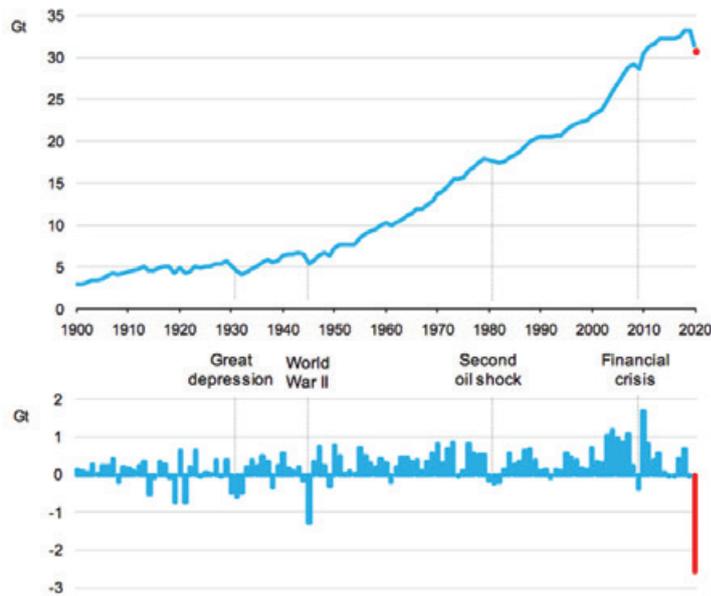
nearly non-limited financial resources has become the new reality for citizens towards whom Governments will have to justify the legitimacy of their action.

And Climate Change will soon emerge as the single most relevant priority driving policymaking in Europe and worldwide.

One Covid crisis every year in the next three decades to reach Paris Agreement targets

The Covid outbreak is not a direct effect of Climate Change, but both





Top: Global energy-related emissions
Bottom: Annual change in GtCO₂, with projected 2020 levels highlighted in red.

Credit: Carbon Brief¹ based on IEA data⁴

are consequences of our human frantic late development model.

But the Covid crisis can however help us to better embrace the magnitude of the climate challenge ahead.

The major disruption and near standstill of economy developing since March 2020 as a result of Coronavirus is expected to lead, according to the latest forecast, to a decrease of over 7% of GHG

emissions this year compared to 2019². It would represent the largest ever annual fall in CO₂ emissions, largely surpassing all previous economic crisis and even war periods.

The recently released Emission Gap Report⁵ establishes that, reaching the 1.5°C target of the Paris Agreement would require global emissions to decrease at a steady rate of 7.6% each year to 2050.

This is to say reaching Paris Agreement target would need a reduction rate equivalent to more than the impact of about one Covid-19 crisis every year, through the next 30 years.

This simple analogy helps to grasp the magnitude of the transformation that will be required globally over the next three decades to avoid climate chaos.

It also hints that similar levels of emissions reduction can only be achieved at the price of substantial changes in our consumption level and therefore living patterns and lifestyle.

Economic recovery: A defining moment for the future of society

In the aftermath of the 2008 financial crisis, more than €1,400 Billion of direct aid from public money were authorized to 215 financial institutions⁶. The Eurosystem Balance sheet has increased from 10% of the Eurozone PIB in 2007 to more than 40% currently⁷. If this stimulus has helped avoiding the collapse of the financial system and the subsequent social consequences, it is however recognized today that it has failed to structurally address the failures of the economic system and resulted instead in further increasing social and financial inequalities.

The Covid crisis has already certainly

“reaching Paris Agreement target would need a reduction rate equivalent to more than the impact of about one Covid-19 crisis every year, through the next 30 years.”

generated a major mentality shift by breaking the sacred rules of financial orthodoxy and by leading EU governments and leaders to consider new solidarity and recovery instruments.

The depth of the economic and social crisis generated by the current pandemic is unprecedented and will require economic stimulus measures to avoid equally unprecedented social chaos, capable of swiftly and vigorously relaunching economic activity and job creation.

But unlike the 2008 financial crisis, EU leaders and governments have the historical responsibility to ensure that such a stimulus is now fundamentally directed towards achieving the promises of the EU Green Deal⁸.

They must do so by massively investing in those sectors that concur to a fair and sustainable Clean Energy Transition while orderly and decisively

disengaging from carbon intensive sectors of the old economy.

They must demonstrate the political courage to fundamentally reset the societal priorities by channeling public money and stimulating private investment with the scale and speed required by the immense challenge of transforming the technological, economic and societal foundations needed to decarbonize the society.

The time has come to stimulate the EU research and innovation powerhouse to ensure EU emerges as a leader and forerunner in the design of the post-Covid green, fair and sustainable development model.

If the EU Green Deal provides a relevant platform for this transformation, its funding must be fundamentally revised to match its ambitions.

The upcoming transformation requires to massively unlock fresh public money to support the redesign of a new sustainable socioeconomic development model. It will not take place with current envisioned budgets, largely resulting from recycling existing instruments combined with unrealistic leverage ratios expected from private investments.

EU Governments and leaders must now stand to their responsibilities and regain democratic support and legitimacy.

This might well be the last opportunity to avoid upcoming climate chaos and societal collapse, whichever occurs first.

And this is a unique opportunity for redesigning our common socioeconomic sustainable future, grounded on a new democratic contract. ●

About EERA

The European Energy Research Alliance (EERA) is an association of European public research centers and universities active in low-carbon energy research.

EERA's mission is to Catalyse European energy research to achieve a carbon neutral society by 2050.

Bringing together more than 250 organizations from 30 countries, EERA coordinates research activities through 17 joint research programs. EERA is a key player and official partner in the EU's Strategic Energy Technology (SET) Plan.

In line with its Mission, EERA is committed to supporting Europe in achieving a successful energy transition in line with the EU's climate 2050 goals and Paris commitments.

Visit: www.eera-set.eu

1 Climate Action Tracker, December 2018 update

2 IEA, Global Energy review 2020, impacts of covid-19 on global energy demand & CO₂ emissions – April 2020

3 Carbon Brief, 30 April 2020. IEA: Coronavirus impact on CO₂ emissions six times larger than 2008 financial crisis

4 IEA, Global Energy review 2020, impacts of covid-19 on global energy demand & CO₂ emissions – April 2020

5 The Emission Gap Report 2019, United Nation Environmental Programme (UNEP)

6 The cost of interventions in the financial sector since 2008 in the EU countries, Antonio Millaruelo and Ana del Río, Banco de Espana, Eurosistema, April 2017

7 European central Bank: Annual consolidated balance sheet of the Eurosystem

8 Ursula von der Leyen Commission: the [EU Green Deal](#), striving to be first climate-neutral continent.



An energy transition for all – Socially innovative policy making

By Nea Pakarinen, ICLEI Europe

If there is anything to be learned from the ‘Gilets Jaunes’ protest in France, it is that social innovation should accompany environmental policymaking. Policies will have little effect without the participation, acceptance and understanding of the people directly affected by the changes. Much of the climate change discourse centers on wide-scale economic, social and cultural change – this rhetoric gives people little agency, leaving many feeling

alienated. Europe will not be able to meet the Sustainable Development Goals, the European Renewable Energy Directive targets and the European Green Deal objective without socially innovative policy making, which entails, by definition, the empowered involvement of citizens in collaborative decision-making.

Social innovation refers to new, creative ways of dealing with our

common challenges, involving transformations in our social relations and practices. Social innovation in the context of the energy transition is a process of change in social interaction and the sharing of knowledge leading to - or based on - new environmentally sustainable ways of producing, managing, and consuming energy that address social challenges. Many pioneering European cities are applying socially innovative approaches in local

sector. This is the case irrespective of the actor involved, whether a citizen or a NGO. Connecting with individuals or groups with existing environmental engagement or taking a step further and developing environmental engagement in stakeholders is a good way to build support.

Recommendation 2: Welcome resistance. People often demonstrate resistance when faced with ambiguity, such as the financial ramifications of a new energy policy. It is important to acknowledge these concerns as valid and to be transparent about associated risks and costs. Identifying hesitant groups and involving them in trial periods and planning, can help alleviate concerns. Policymakers should act as facilitators, rather than micromanaging the process.

Recommendation 3: Be trustworthy. Trust in the abilities and good intentions of stakeholders and decision makers is a key factor for the acceptability of new policies. A recent study in France indicated that very few people deny climate change (irrespective of their social status), but they do not trust institutions to be able to fix it. Participatory processes are a good way to strengthen trust, especially with disadvantaged groups suffering from energy poverty. Giving people opportunities to express concerns and fostering wider dialogue in order to avoid polarization and exclusion of groups is important.

Recommendation 4: Accommodate those in need. The success of policies depends on the extent to which decision makers understand the connection to social status. Regressive effects of policies should be avoided at all costs – a successful and socially innovative energy policy should result in the empowerment of the groups suffering from energy poverty. Allowing disadvantaged groups to participate in the energy transitions on their own terms might

take time, but will foster acceptance in the long term.

Recommendation 5: Remember it is a team effort. It is crucial to educate those who will implement the policy in practice. These are the groups the public will be in direct contact with, so their communication and relationship-building skills are crucial. Planning a strategy to provide the necessary knowledge and skills (e.g. language) to these actors will prove worthwhile.

Recommendation 6: Do not expect everyone to care. A sustainable energy transition might not be first on the agenda of a community that is facing other challenges. Asking people to focus on the big picture when they feel a lack of agency is not motivating. When communities face issues such as social exclusion or low community cohesion, it is recommended that public discourse and policies explicitly highlight the potential of the innovative solution to solve these problematic issues, even if this would be an indirect effect.

Policy Recommendation 7: Look out for loop- and pot-holes. Regulations and laws can act as both drivers of and barriers to social innovations. Plenty of time and effort can be saved by making sure to take stock of existing ambiguities in regulations - finding opportunities for amplification and exploration.

Policy Recommendation 8: Use the media as a mediator. Social innovations are often attractive stories for the media. In order to avoid negative publicity and raise awareness about the benefits of the policy - developing a media strategy and establishing contacts that actively report on the process is a good way to keep the public engaged and informed.

Policy Recommendation 9: Reroute routines. Habits and routines are barriers to innovation. To shake up

energy transitions with replicable processes. Based on studies in such cities - the following nine practical recommendations are a red thread for any policy maker to follow when planning and implementing novel energy policies.

Recommendation 1: Build on existing engagement. Pro-environmental dispositions have been found to be important drivers of social innovations in the energy

Windmill in Samsø
Photo: ©ICLEI Europe

those stuck in a rut – introducing policies through creative measures is beneficial, e.g. hosting an informative city festival or by demonstrating future scenarios visually. For the planner, it is crucial to be open to change, based on the collaboration with citizens outlined in the recommendations above. To avert the policy itself becoming stale with

time, it is important to promote the socially innovative policy as a flexible structure, leaving room for critical thinking, optimisation and change. Inexpensive trials and pilot projects that are not set in stone are a good way to gradually introduce changes.

These findings are based on a report on social innovation drivers, barriers,

actors and network structures for social energy innovation² that was published under a transdisciplinary Horizon2020 research project on ‘Social Innovation Modelling Approaches to Realizing Transition to Energy Efficiency and Sustainability’ (SMARTEES). The report highlights these themes through case studies conducted in various European cities. ●

Aberdeen Combined Heat and Power Plant
Photo: ©ICLEI Europe



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HIGH PERFORMANCE GREEN PORT GIURGIU

A NEW LOGISTICS HOTSPOT IS EMERGING

The global main objective of “High Performance Green Port Giurgiu” is to transform the port of Giurgiu into the first efficient green port on the Danube. This project is funded with 85 % by the European Union.

The construction of the first tri-modal logistics center on the Lower Danube with a fully covered ship berth built by ILR Logistica Romania is in progress. In this building it will be possible to load and unload trucks, wagons and ships independent of any weather conditions.

The connection of the tri-modal logistics center to the public railway (about 740 meters newly built railway track) and the rehabilitation of the access roads inside the port area (about 1.3 km) are nearly completed.

For the foundation of this new logistics center thousand tons of filling material were necessary and more than 920 concrete piles had to be drilled to protect the logistics center from high water of the Danube. The highlight of this logistics center will be a ship berth inside the hall.

The logistics center will be equipped with 2 bridge cranes and a modern computer-based supply chain management system. An increase of the annual capacity of the port from current 140,000 tons to 300,000



tons in the next years is the objective. Furthermore it will create new jobs in the Giurgiu region.

At the beginning of 2021 operation in this most modern logistics center in Southeastern Europe will start. It ensures a quality-assured transshipment of high-class industrial goods like steel or automotive components and offers companies a perfect logistical infrastructure.

The effects of this logistics project will positively influence the macro-economic, environmental and social aspects in the Giurgiu-Bucharest-Russe region in the next years.



FACTS & FIGURES

Size of the logistics center: 230 m length, 40 m width

Size of ship berth inside the hall: 100 m length, 15 m width

Equipment: 2 bridge cranes with a lifting capacity of 42 tons



Co-financed by the European Union
Connecting Europe Facility

www.ilr.com.ro/projects/high-performance-green-port-giurgiu.html

Goodbye oil, hello renewables! How Upper Austria is eliminating oil heating

By Christiane Egger & Megan Gignac, OÖ Energiesparverband, Upper Austria

Upper Austria, one of Austria's nine regions with a population of 1.5 million, is strongly committed to the energy transition and significant progress has already been made. Greenhouse gas emissions in the buildings sector were reduced by 32% in the past 10 years and 60% of all space heating now comes from renewables.

Only 18% of dwellings are still heated with oil. Although this might not sound like much, these oil heating systems – around 115,000 – are

responsible for a staggering 45% of the region's remaining building CO₂! Similar oil heating penetration can be seen in many parts of Europe. With a choice of affordable and highly-efficient renewable options available (heat pumps, automatic biomass boilers, district heating from renewables, solar), moving away from oil heating is the next logical step in the energy transition.

This is being achieved in Upper Austria through a clear regulatory framework, attractive financial incentives and

an elaborate media and information campaign developed and managed by the OÖ Energiesparverband (ESV), the regional energy agency. By 2035, there will be no more oil heating in Upper Austria!

STICKS, CARROTS AND TAMBOURINES FOR THE ENERGY TRANSITION

Well-established policy structures to tackle the energy transition are already in place. The region's multi-faceted approach is based on a combination of regulatory measures



(“sticks”), financial incentives (“carrots”) and information and training activities (“tambourines”).

In its dedicated efforts to eliminate oil heating, a range of measures are being used, including:

- **a clear regulatory framework for banning oil heating:** since 2019, no oil heating in new buildings; according to the federal government’s programme, no replacement of broken boilers as of 2021; all boilers over 25 years-old must be replaced as of 2025; no more oil heating by 2035!
- **attractive financial incentives:** a regional subsidy of up to 3,900 Euro for the replacement of a fossil-fuel heating system, periodically supplemented with funding from the national government
- **stringent emissions and efficiency standards** for the new heating system embedded as criteria in the funding programmes to ensure high environmental standards
- **free on-site energy advice** for homeowners to guide investment decisions
- **a large-scale multiplier campaign** “AdieuÖl” (Goodbye oil) developed and managed by the OÖ Energiesparverband.

WHO IS THE TARGET GROUP?

Clearly identifying who to address with policy and information measures is an important step. Market analysis revealed that many of the oil-heated homes were built in the 1990s and are mostly in rural regions.

Often, the same family that built them still lives in them. The owners are not particularly environmentally conscious – or they would have already replaced the oil system – and their heating bills are not a main issue for them.



This analysis was helpful in understanding that communication would need to focus on other elements than climate protection and energy cost savings, which had not motivated them so far. It was necessary to find arguments they could relate to.

KEY MESSAGE: IT’S AS EASY AS 1-2-3

It’s simply time to say goodbye to oil heating. This is the core message of the campaign. Emphasis is put on using friendly language without criticism or reproach. Communication revolves around 3 main arguments:

1. **Oil heating is not modern anymore, it is dying out:** less and less people heat with oil and soon it will be completely banned; old oil systems need increasing amounts of repairs; no more oil smell in your home
2. **Switching is simpler than you think:** you can choose from a range of systems; free tailored

energy advice by the ESV is available; the switch requires just a few easy steps

3. **The investment pays off:** for you (lower energy costs); for the economy (less energy imports); for the environment (oil harms the climate)

The refurbishment of a heating system is not a small investment. This is a significant barrier, especially for low-income families. However, this simply stresses even more the need to act. It is crucial to reach socially vulnerable oil heaters now since subsidies cannot be given once legislation banning oil heating is in place.

ADIEUÖL – AN ELABORATE STAKEHOLDER CAMPAIGN

In 2019, the OÖ Energiesparverband launched a large-scale information and public awareness campaign supported by the Regional Minister of Energy. Its strategy is to activate stakeholder groups who can identify oil heaters and communicate directly



with them. The campaign reaches out to people in their social environment and uses the power of civil society and community.

Municipalities – key partners for their ability to directly interact with oil-heating homeowners – were invited to become “AdieuÖl municipalities” (already 42 have joined!). By participating, these municipalities can increase their own visibility as leaders in the energy transition. They receive ready-to-use material and support the campaign through targeted reach-out to oil heaters (i.e. by contacting and motivating them, organising info talks and events etc.)

Many installers and equipment manufacturers have also joined the campaign through actions such as offering “AdieuÖl” rebates, contacting existing clients with oil heating, communicating via their own channels, and organising activities with local communities and schools. Last but not least, schools, associations and clubs (i.e. Fridays for Future, voluntary fire brigade, scouts, church groups) got involved with a wide range of school activities, action days, funny videos, social media, and others.

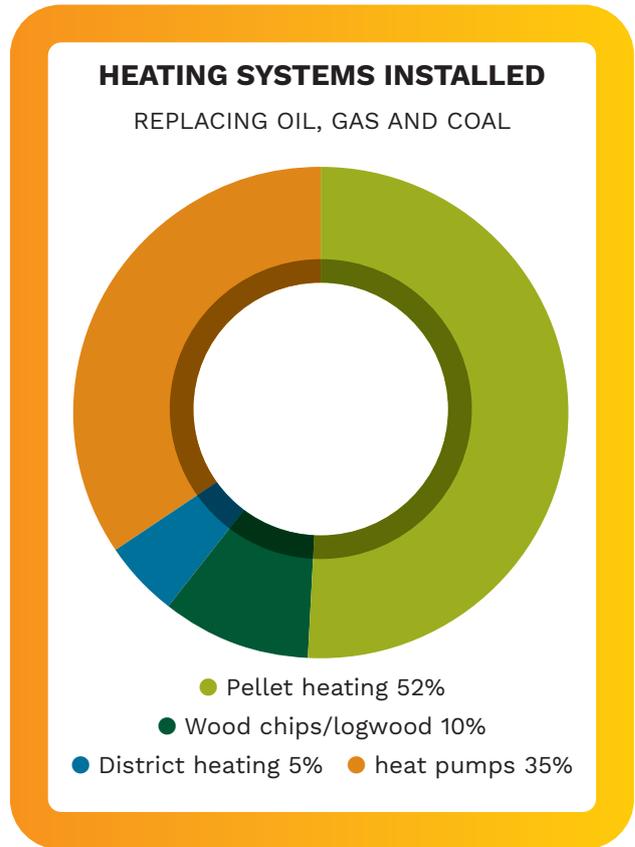
In addition, the ESV led several campaign actions such as a big AdieuÖl competition with several

thousand Euro in prize money, information stands at energy and building tradeshow, weekly AdieuÖl-News, TV advertisements, a website, information folders, and communication through the agency’s own channels (newsletters, events, social media etc).

**HELLO RENEWABLES!
 HELLO ECONOMIC RECOVERY!**

Upper Austria is giving a clear sign of its commitment to leaving oil behind. True momentum has been created for achieving a critical mass where oil heating is simply no longer accepted. Only highly-efficient renewable technologies make the cut. The chart above shows the distribution of heating systems installed in the context of last year’s funding programme.

Phasing out fossil fuels is already an important component of the Austrian post-corona recovery action. A new programme launched in May 2020 will trigger the replacement of 20,000



fossil fuel boilers and half a billion Euro investments in private homes in Austria by the end of this year. This shows how much the energy transition is an economic and social opportunity! The time has come to eliminate oil heating. Join us in saying “Adieu” to oil! ●

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NERO – the woody North

Wood for Zero.

Nordic countries have long traditions of building wooden houses. This year 2020 all new buildings in EU have to be nearly zero energy buildings (nZEB).

Within the Horizon2020 NERO project, we are studying seventeen Nordic wooden buildings, for wider market uptake and as a tool for national and EU wide decision making. Some of these buildings are completed while others are under construction. We will develop and demonstrate technical solutions, which will reduce the costs of new wooden nZEB buildings compared to the current structures.

What for?

The City of Kouvola in Finland has rapidly adopted the national nZEB concept. As a backbone to the city's building plans in the private sector, prefabricated wooden buildings can provide a solid solution to achieving nZEB requirements in a cost-effective manner.

In the City of Växjö, the NERO project will be one of the measures helping to reach the 2030 zero fossil carbon dioxide emissions target. In Estonia the manufacture of wooden buildings has developed to be one of the key industries with 140 enterprises, supplying around 85-90% of the housing stock. In Norway, SINTEF has pointed out that the NERO project provides an excellent opportunity to contribute through past experience and acquiring new knowledge in wooden structures and nearly zero emissions buildings.

Evaluating the results so far

Some of the detailed summaries are now being completed and can be found on the NERO webpage under the title "General materials".

Today, as country specific results in Finland different technical solutions and energy performance levels, all affecting the investment costs, has been compared as life cycle costs.. Referring to calculated energy to measured energy used represent, for 20 years use, the energy costs rise on the average from 6-8% to 15% of the LCC. To bring the consumption of energy under control, to find the more cost effective and technical solutions for energy efficiency affecting the energy consumptions and costs are one of the key element for cost reduction in Finland.

The techno-economic aspects focus on construction process times, procurement processes, and general project management. The NERO demonstration Finnish project is the beginning of a new industrialization process in the Finnish construction business.

Växjö Kommunföretag in Sweden has focused on wood-



“Vallen Norra A” is a 9-floor apartment building in Växjö, Sweden. Completed in 2015. Greenhouse gas emissions (GHG) and embodied energy (CED) studied in NERO.



Finnish 4-section wooden day care center “Lehtomäki” in Kouvola Finland. Completed in 10.2018. National nZEB building (class A), with geothermal heat and PV panels.

frame residential buildings. The optimal cost analysis is showing that the insulation thicknesses required to achieve nZEB energy levels are considerably higher than those applied in the current Swedish building code. The Swedish results of the life cycle analysis show that wood-based building systems give lower primary energy use as well as reduced carbon emission compared to non-wood alternatives.

Tallinn University of Technology has worked on cost reduction for new nZEB wooden buildings. Their recommendations in NERO focused on efficient heat source, compact building volumes, well-insulated and airtight building envelopes and specifics for ventilation systems.

Sintef compared the improvements of energy efficiency and reduction in greenhouse gas emissions, from national TEK17 requirements to the NERO Norwegian demo. It was found that profitability on a 20-year perspective depends on the heating system energy efficiency. ●

<https://www.neroproject.net/>

What does it mean to be a good environmental citizen?

By Dr Andreas Hadjichambis, Chair of the European Network for Environmental Citizenship and Scientific Director of Cyprus Center for Environmental Research and Education CYCERE

Which are the talking terms for green citizen action? A COST meeting has defined key concepts that help teachers and organisations to encourage people to care for the planet. An online database, book and global outreach add to the support.

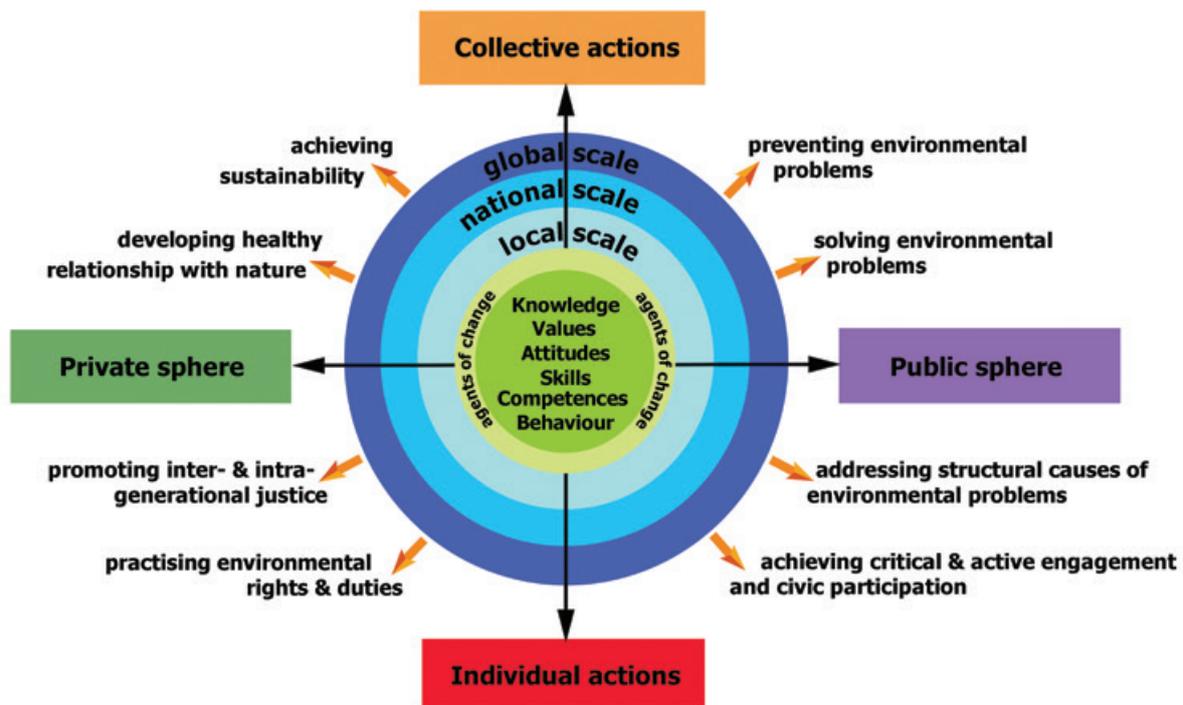
Plastic pollution, climate change and the loss of biodiversity are just some of the many environmental issues in the news every day. Actions by citizens are central to EU plans to tackle these issues – for example, the proposed [European Green Deal](#)

and the EU [2050 strategy](#) for a low-carbon Europe.

But first, people must agree on how citizen action should work. A meeting of the [European Network for Environmental Citizenship \(ENEC\)](#) – a COST Action – has

defined “environmental citizenship”, the “environmental citizen” and “education for environmental citizenship” to provide ground rules for bottom-up initiatives for the planet.

According to ENEC Chair, Andreas



Source: Hadjichambis, A. Ch. & Paraskeva-Hadjichambi D. (2020). Education for Environmental Citizenship: the pedagogical approach. In: A. Ch. Hadjichambis, P. Reis, D. Paraskeva-Hadjichambi et al. (Eds) *Conceptualizing environmental citizenship for 21st century education* (pp 237-261). Cham, Switzerland: Springer.



Hadjichambis of the Cyprus Center for Environmental Research and Education, the concepts are new and until now, understood by researchers in often contradictory ways.

With over 130 experts from Europe, Israel, Australia and the USA in ENEC, the Action has created an international consensus that can be a framework for educators, researchers, NGOs and policymakers worldwide.

“This common language is an important and valuable step,” Hadjichambis explains. “ENEC’s definitions bring Europe to the forefront of attempts to achieve environmental citizenship.”

Global reach

The [full definitions](#) are based around the idea of environmental citizenship as “...the responsible pro-environmental behaviour of citizens who act and participate in society as agents of change”. Details specify citizens’ rights, duties and how they should act to achieve sustainability and a healthy relationship with nature.

The texts were agreed at the [ENEC first meeting](#), a three-day event in Cyprus. Participants first reviewed the existing approaches among scientists to environmental citizenship. With outside specialists from fields such as environmental sciences, education and law, groups then reviewed, analysed, and debated concepts for the terms.

“Interdisciplinarity and transdisciplinary were very important in our approach,” says Hadjichambis.

More widely, the Action is sharing knowledge about environmental citizenship. ENEC members have created an [online database](#) of measures and actions and published a [free online book](#), along with dozens of smaller publications, presentations and scientific posters.

Other outreach includes an international conference, ‘International Researchers of Education for Environmental Citizenship’ ([iREEC2019](#)), along with training schools and science cafés.

In its next two years, ENEC aims to promote its perspective, propose policy measures, and create a scientific community dedicated to the topic.

It is an ambitious plan.

“ENEC’s definitions bring Europe to the forefront of attempts to achieve environmental citizenship ... Environmental Citizenship is crucial for the European Green Deal.”

“We want our ideas to be disseminated on a global scale,” Hadjichambis concludes. ●



View the Action:
<https://www.cost.eu/actions/CA16229>

View the Network website:
<http://enec-cost.eu/>

Wastewater is bioenergy and moves clean vehicles

Water is one of nature's most valuable resources and a key ally in the transition to a green and decarbonised economy. The treatment of wastewater allows the production of cleaner energy: biogas, a renewable gas that is less polluting than conventional fuel, which can be used to power vehicles and in the generation of heat and electricity. A new biogas cleaning and upgrading process is currently being demonstrated in many wastewater treatment plants (WWTP) in Spain to produce biomethane.

The use of biogas reduces emissions from industry, transport and housing, and combats climate change to meet No.13 of the UN Sustainable Development Goals (SDGs), also No. 7, focused on affordable and clean energy. This goal can be achieved in synergy with objective 6 of the 17 SDGs, sustainable and democratic water management, to provide safe drinking water to the three out of every ten people in the world still lacking access to it.

Companies like Aqualia, serving more than 25M users around the world, are applying energy efficient and economical solutions to change towards a low emission society. In 2014 it became the first water company in Spain to calculate the carbon footprint of all its activity and register it with the Spanish Office for Climate Change. This allows the company to forecast and globally account for the CO₂ emissions produced by all its activities, and reduce its impact.

Aqualia has several projects aimed at removing pollutants from the wastewater produced in our homes and transforming it into biogas to move vehicles. The latest project to join this list has been Ulises*, based in Almería, and co-funded by the LIFE Programme of the European Union to promote the environment and to prevent climate change. In the last year, Aqualia has increased the production of this renewable gas in various of its 20 larger wastewater treatment plants, with a potential to power a fleet of up to 10,000 vehicles.

To facilitate this, the company has developed a biogas purification process called ABAD Bioenergy. The objective of this patented procedure is to clean and enrich at low cost the raw biogas obtained from the fermentation of the sludge resulting from the treatment of urban wastewater.

This system to produce biomethane has been selected by the Ministry for Ecological Transition as part of the Carbon Fund for a Sustainable Economy (FES-CO₂).

Aqualia already has four ABAD plants operating in Chiclana and Jerez (Cádiz), Lleida and Madrid, linked to the FP7 All-Gas and the SmartGreen Gas projects. Co-funded by european projects, four new plants will be installed this year, located in Madrid, Almería, Guijuelo (Salamanca), and Czech Republic. The last four will each have a biogas production capacity to fuel 90 vehicles a day. Each of these biogas plants avoids the emission of more than 50 tons of CO₂ per year. ●



*Life Ulises project is funded with de contribution the European Union LIFE programme LIFE18 ENV/ES/000165.This article reflects only Aqualia's view. The European Commission is not responsible for any use that may be made of the information it contains.

PHOTOVOLTAIC ENERGY

**Benefits for cities and recovery
of the local economies**

Solar power – less means more



Benefits for cities and recovery of the local economies

By Arnulf Jäger-Waldau, European Commission, Joint Research Centre

In November 2019, the United Nations published a report, which stated that worldwide greenhouse gas (GHG) emissions over the next decade would have to decrease by an average of 7.6% annually to stay on a pathway to limit global temperature rise to 1.5°C^[1]. The use of fossil fuel sources for energy (62.2%) and industry processes (8.3%) contributed to more than 70% of the total CO₂ emissions in 2018^[1, 2]. These numbers give evidence that the reduction of fossil energy use is the most important building block to achieve the necessary GHG reduction targets.

The urgent need for decarbonisation

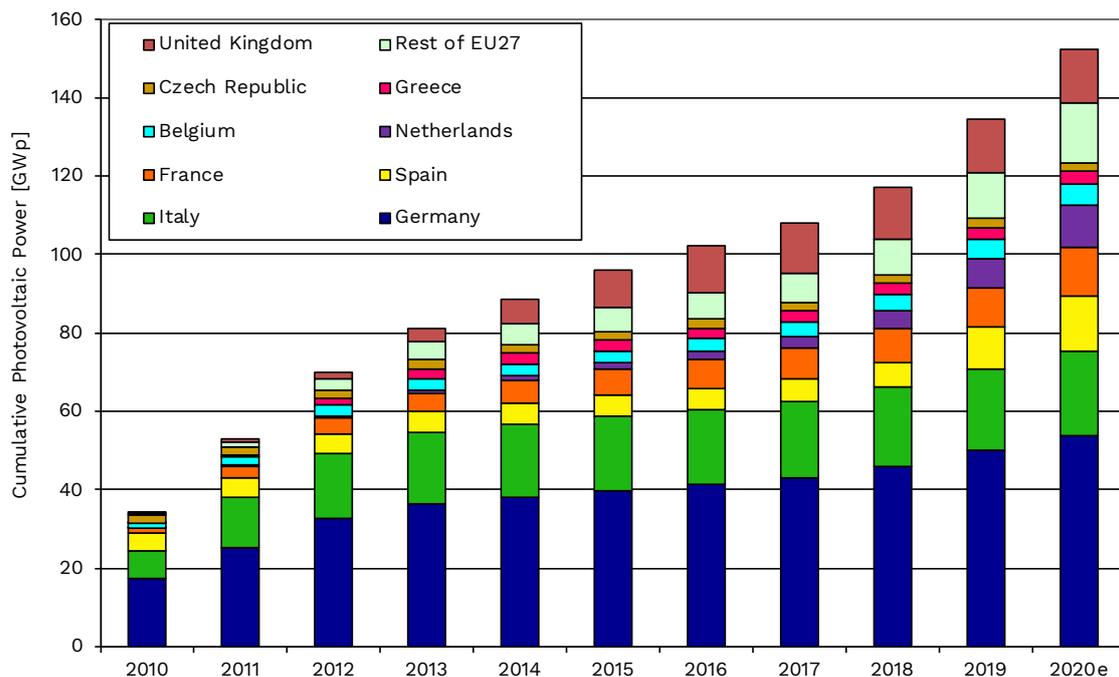
of the power sector was stressed once again during the COP25 meeting in Madrid, Spain in December 2019. Special advisor to the UN General Secretary, Jeffery Sachs, outlined during COP25 that time is running out and to stay on the 1.5°C pathway all signatory countries to the Paris Agreement must come forward with realistic decarbonisation strategies by 2050 for their respective countries before COP26, which has been postponed to 2021.

Despite an overall increase in CO₂ emissions in the power sector to 13.64Gt globally, the increase in conversion efficiency and the share of

low carbon technologies in the power mix has resulted in a 10% reduction of CO₂ per unit of electricity to 475g CO₂/kWh in 2018 compared to 2010. The power sector was thus responsible for 41.2 % of the energy-related CO₂ emissions and 25.6% of the total emissions. However, to meet the targets of the Paris Agreement, CO₂ emissions from the power sector have to decrease to 65g CO₂/kWh by 2050^[3]. Europe faces even a bigger challenge, as its electricity emissions should decrease to 45g CO₂/kWh by 2050.

In December 2019, the European Commission presented the European

Figure 1. Grid-connected PV capacity in EU and the United Kingdom, including JRC estimates for 2020^[10]



Green Deal^[4], an initiative “to increase the EU’s greenhouse gas emission reductions target for 2030 to at least 50% and towards 55% compared with 1990 levels in a responsible way” and to achieve climate neutrality by 2050. In March 2020 a European Climate Law was proposed to give a legal framework^[5].

In a recent study the Joint Research Centre (JRC) analysed the role of photovoltaics for a 55%GHG reduction by 2030, largely based on politically agreed long-term strategy (LTS) options for 2050^[6, 7]. The findings show that the range of PV capacity varies between 450 and 605GWp by 2030. With the assumption of a more rapid electrification, this could rise to 1.2TWp in the European Union, a number which is close to the number necessary for a pathway to 100% renewable energy supply for Europe by 2050^[8]. Moreover, by providing energy close to the point of use, rooftop photovoltaic installations improve the overall efficiency of the energy system. In 2018, the primary energy input in the electricity and heat sector in the EU-28 was 7,589TWh, which resulted in 3 950 TWh output of which 3,277TWh were electricity^[9]. In addition to the transformation losses of 3,639TWh in the electricity and heat sector, the electricity sector had distribution losses of 209TWh. Rooftop photovoltaic providing electricity close to the point of use do not contribute to transformation or distribution losses.

Rooftop solar photovoltaic (PV) systems offer the possibility to provide clean electricity close to the point of use in cities, reduce the need for long distance transmission and generate local jobs for the installation and maintenance sector. Compared to large-scale utility systems rooftop installations have higher capital costs, but offer the chance to offset higher residential electricity prices in contrast to utility scale systems, which have to either secure power purchase agreements (PPA) or

compete in the wholesale market. Therefore, the value of electricity generated from rooftop systems vary significantly in the European Union, depending on the local energy taxation, incentives, and retail price structure. In addition, rooftop PV systems can lower the stress on the grid, which has to satisfy an increasing electricity demand for electric vehicles as well as heating and cooling.

To quantify the availability of rooftop area for the installation of PV systems, the JRC performed a high-resolution geospatial assessment of the rooftop solar photovoltaic potential in the European Union^[10]. With conservative estimates about the area requirements for a PV system and the current commercial mainstream PV technology, the technical potential in EU(27) was about 640TWh and the current economic potential was 460TWh for PV systems on existing buildings. This would require about 560 and 400GWp of installed PV power respectively compared to the roughly 121GWp reached at the end of 2019 (Figure 1)^[11]. About 60% of this capacity or 75GWp was on roofs.

Additional potential for PV systems on roofs will come when the concept of Nearly Zero-Energy Buildings (NZEBs), established in the Energy Performance of Building Directive recast, is implemented in national legislation with mandatory requirements to install renewable energy systems in new buildings^[12]. The JRC estimates that approximately 1.5 million new residential buildings are constructed every year. Adding 4kWp PV to each project would potentially add 6GWp per year.

After a decline of the European photovoltaic market from 2011 until 2017, the market picked up again in 2018 and this trend continued in 2019 (Figure 2). However, to reach the 2030 GHG reduction targets, the annual market has to increase from 16.5GWp

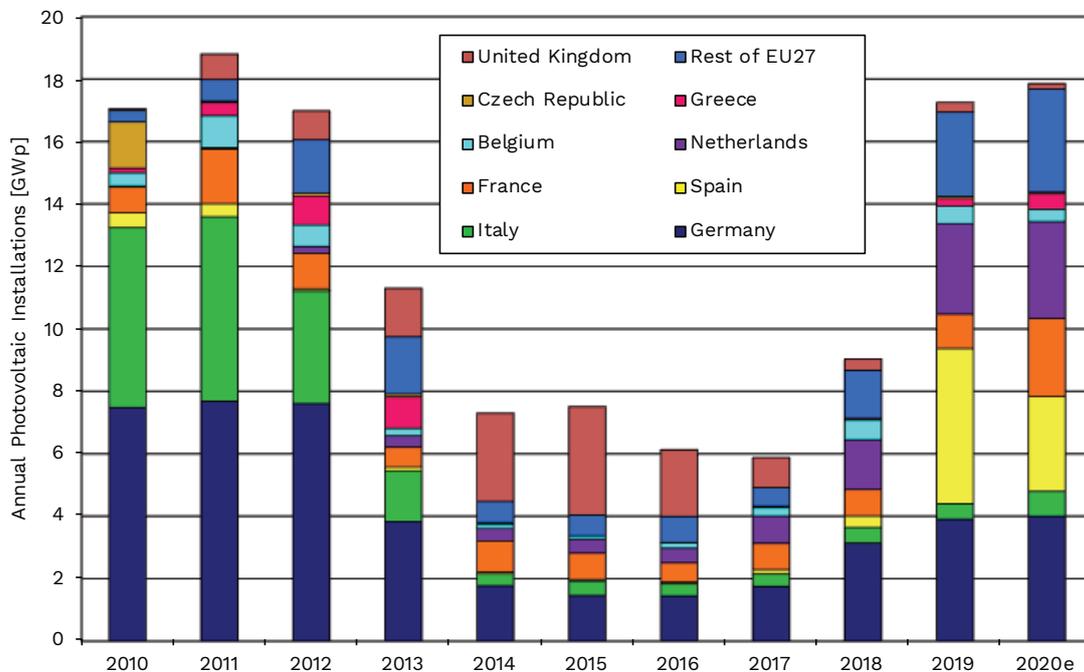
in 2019 three to nine-fold until 2030.

The realisation of the rooftop potential on existing buildings would require the installation of an additional PV capacity of 325 to 485GWp. The installation of this capacity would create a significant number of local jobs. According to the USA Solar Census, about 3.5 full time work equivalent (FTE) per MW and year of installed PV systems were needed in 2018^[13]. The quantification of jobs in the rooftop system segment is more difficult as these jobs depend significantly on local regulations and building codes. However, taking the large system FTE per MW as a lower bound benchmark, the installation and maintenance of new rooftop systems could add 100,000 to 190,000 jobs by 2030. These numbers refer to direct net employment and are in line with detailed studies that recognise the importance of solar PV sector as job creator^[14]. With the current slow-down of the economy due to COVID-19, an accelerated deployment of solar photovoltaic rooftop systems could help local small and medium size rooftop PV businesses to recover at a faster pace.

Already in 2018, the European Economic and Social Committee highlighted some positive effects of a decentralised renewable energy supply on jobs and regional economies^[15]. Decentralised local renewable can enhance local wealth, particularly in regions with no or little own fossil energy resources, where significant amounts are spent on import to meet energy needs. Self-consumption of electricity from PV systems in the Podlaskie region, Poland, is one of the examples highlighted to boost regional purchasing power.

How can this great potential of PV systems on rooftops be unlocked to help achieving the European climate ambitions and bring benefit to the local economies?

Figure 2: Annual photovoltaic installations in the European Union and the United Kingdom, including JRC estimates for 2020^[10]



Self-consumption of electricity generated from rooftop systems can be one solution, but there are a number of shortcomings concerning the economic aspects and effective utilisation of suitable areas.

Commercial PV rooftop systems can already provide a high percentage (>50%) of self-consumption and, if coupled with local storage, offer the additional advantage of reducing the demand charge, which depends on the maximum amount of power (kW) drawn for any given time interval (typically 15 minutes) during the billing period.

One of the problems in residential buildings is that self-consumption in most countries has been limited to the owners or tenants of single family homes or small PV systems in apartment buildings. This discrepancy between generation and consumption results in relative small

PV systems which do not fully exploit the rooftop area.

Additional potential can be found on rooftops of multi-apartment buildings or office buildings with multiple ownership. The right to self-generate and consume self-produced electricity was already listed as an option by the 2016 European Commission (EC) initiative "New Deal for Energy Consumers: Empowering Consumers, Developing Demand Side Response; using smart technology; linking Wholesale and Retail Markets; Flanking Measures to Protect Vulnerable Customers"^[16]. This right is now part of the revised renewable energy directive, which was published on 21 December 2018^[17].

However, due to unfavourable, still missing or even prohibitive regulations in several EU member states, this potential for self-consumption of commonly

generated PV electricity has not been tapped yet. Over the last few years, the concept of PV system use in apartment buildings has gained momentum and new economic concepts have been developed to use the electricity from a common PV system for all tenants in such buildings: now referred to as "collective self-consumption". Within the Photovoltaic Power Systems Programm of the International Energy Agency (IEA PVPS) Task14 monitors the developments in different countries and regularly reports about it^[18]. The main obstacle for a wide spread uptake of PV generated electricity with self-consumption are not of technical nature, but regulatory ones.

The additional concepts of energy communities were introduced into European legislation by the 2018 recast of the European Renewable Energy Directive (RED II)^[16] and the 2019 recast of the Electricity Market

Directive (EMD II)^[19]. RED II defines “Renewable Energy Community” (REC), whereas EMD II talks of “Citizen Energy Community” (CEC). Both concepts are similar, but also have some critical differences. The common element is that both energy communities are set up as a legal person. Their primary objective is to provide environmental, economic and social community benefits, rather than financial profits, and they have to be controlled by their shareholders or members. The main differences concern the geographic location and allowed activities and technologies. Members of RECs must be located in the proximity of the project and can only develop renewable energy projects, but in all sectors. On the other hand, CECs have no geographic limitations and Member States can even allow cross border activities. In addition, the activities of CECs are limited to the electricity sector but not obliged to use renewable energy sources.

If these concepts were promoted by national regulations and supported by measures under the Green Deal,

coupled with the upcoming COVID-19 recovery package, the deployment of rooftop PV systems could spike up, reaching full potential within the next decade. Therefore, measures enabling the participation of multi-apartment building residents along with appropriate regulatory and legal conditions are necessary to secure a fair financing of the required grid infrastructure and provide economic benefits to residential PV system operators and society. Community initiatives as well as financial and political de-risking instruments are crucial.

This is one contribution to

achieve the European Union's Climate ambitions and help local communities to recover from the current economic downturn as well as decrease the energy import dependence and lower the cost of energy supply. ●

The scientific output expressed is based on the current information available to the author, and does not imply a policy position of the European Commission.

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<https://ec.europa.eu/jrc/en/research-topic/photovoltaics>

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Solar power – less means more

By Dr Monica Lira-Cantu, Group Leader of the Nanostructured Material for Photovoltaic Energy Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2)

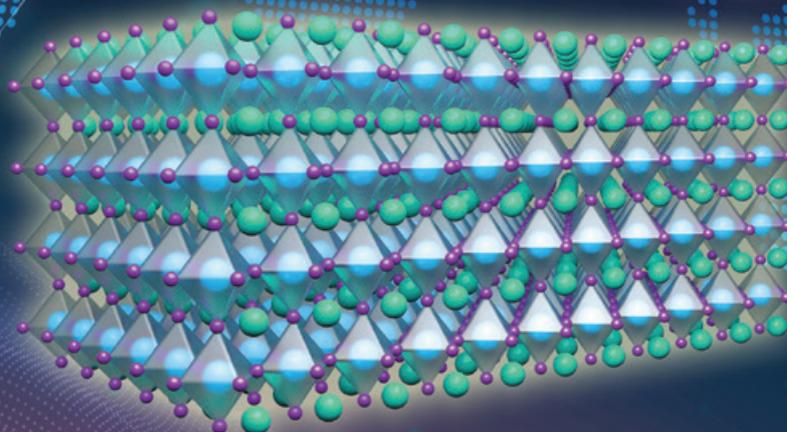
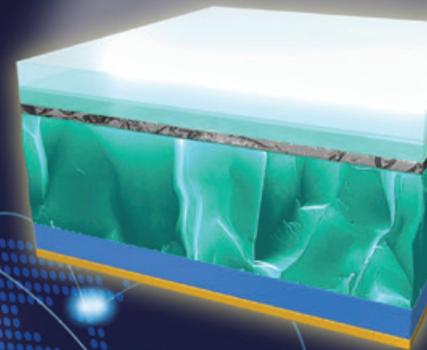
Solar cell technology is evolving to become cheaper, easier to manufacture and lighter. These innovative cells could last longer and produce more energy thanks to a COST network that has also shone a light on women researchers in this field.

Organic and halide perovskite (HP) solar cells are some of the latest innovations in photovoltaic (PV) technology. Unlike

classic silicon PV cells, HP cells use materials that are readily available, could be manufactured for less cost, and can be lightweight, transparent, and flexible.

To make these new cell types more productive and stable, more than 480 participants from 35 countries and 22 industries joined the COST Action ‘Unravelling degradation mechanisms

The StableNextSol project: a COST Action project with more than 480 members from 36 countries and 22 industries





Part of the female force in the StableNextSol COST Action project

of organic and perovskite solar cells by complimentary characterization techniques' (StableNextSol).

Participating researchers have brought HP cells' efficiency closer to commercial viability and increased knowledge on improving cell lifespans, says Action Chair, Monica Lira-Cantu of the Institut Català de Nanociència i Nanotecnologia (ICN2) in Spain. Almost 40% of the network's participants were women, fostering talent for this important but male-dominated field, she adds.

StableNextSol increased the percentage of sunlight that HP cells can convert into power to 25%. "This is almost the efficiency of silicon cells" says Lira-Cantu.

A bigger challenge is the stability of HP cells, which can perform at full efficiency for just months but will have to perform well for 20 years to match silicon cells. "We now understand more about their degradation mechanisms to help future cells become more stable," she adds.

Expanding the field

"The halide perovskite cell industry could become important in Europe," Lira-Cantu says. She explains that the technology increases manufacturing

and application options. Unlike silicon solar cells, organic and HP cells can be made at low temperatures with relatively simple techniques such as roll to roll, ink-jet or similar printing methods on flexible substrates like plastic.

Innovative uses could include lightweight solar panels for portable applications or power for wearable health monitoring devices for the IoT applications, among many others.

Much of the StableNextSol innovation took place in short-term research exchanges. "COST Actions allow experimental, innovative research. This is very useful for early-stage technology," she says. Many H2020 projects and Marie-Curie fellowships, several ERC grants and ITN networks have emerged from the consortium to continue the work.

To share research, the Action held about six industry days and a training school, and posted extracts from the [first](#) and [last](#) network conferences online. "All contributions were welcome and equal," says Lira-Cantu.

In particular, StableNextSol promoted the visibility of female researchers. "Before COST, we heard a lot that only a few women were working in

photovoltaics. We showed that we are here," Lira-Cantu says.

"People saw the level and quality of women's work in solar cell research," she adds. "Usually 70 % of people at conferences are men and there are few women speakers. Since this COST Action we have seen an increase in the participation of female scientists."

The outcomes of the StableNextSol COST Action project are still being witnessed today. They have recently released a document for the Stability Assessment of Perovskite Solar Cells which has been published in [Nature Energy in January 2020](#) and include the consensus of more than 60 authors from several countries on how to test and report solar cell stability. ●



View the Action:
<https://www.cost.eu/actions/MP1307>

View the Network website: stabilenextsol.eu

Our future is charging

By Anna Lisa Boni, Secretary General, EUROCITIES

The past months have been marked by a sense of uncertainty, and many are worried about the future. Stuck in this present it is difficult to imagine where we will be in a few months' time, let alone in 5 or 10 years. For city leaders and administrations, however, successfully thinking about a future in which we will safely move around in a healthier and cleaner environment is more important than ever.

The post-COVID 19 vision that cities strive for is one where the e-mobility transition is central in achieving climate and air quality goals. This transition goes hand in hand with the development of adequate recharging and refuelling infrastructure.

The European Green Deal, a cornerstone of the current European Commission's political ambitions, looks set to herald greater investment in charging infrastructure. From a city perspective this infrastructure must be deployed in line with the growth of e-vehicle sales and be accessible to everyone, making it easier for people to opt for alternative and greener

modes of transport. Already many cities are taking the lead.

Reality needs to feed savvy planning

The use, and by extension the user, should be at the centre of planning such charging infrastructure. The EU-funded USER-CHI project, with its seven partner cities, does exactly this and perhaps the clearest example of this approach will be tested in the project demo sites in Berlin, Barcelona, Budapest, Rome and Turku, which will develop an online tool, CLICK, to plan their charging infrastructure with a user centric perspective.

City authorities will have to input existing data in the tool and CLICK will respond with its suggestion on how to best deploy future charging infrastructure. For the tool to be effective, however, cities will have to have access to complete and accurate data such as user needs and habits, existing charging infrastructure and technologies available on the market.

Data was also crucial in Utrecht's approach, which based planning on usage rates of tendered charging

infrastructure. If the average utilisation of a public charge point rises above 70% in a residential area during peak hours, the city authority will install an additional charging point at a nearby location.

Despite these successes, the availability of data for long term planning to city authorities is currently limited and undermines the effectiveness of alternative fuels infrastructure deployment. Therefore, a comprehensive approach should be established at European level that ensures city authorities have access to the datasets necessary for enhanced decision-making and planning.

While some cities explore planning strategies, others test new technologies to make the most of existing infrastructure and vehicles. This is the case of Rome which will test 'Vehicle-to-Grid' solutions within the USER-CHI project. This technology lets e-cars exchange energy with the grid, so they become 'mobile charging stations', while also providing electric vehicle users with advantageous pricing schemes.



Examples such as these not only allow cities to support the planning and decision-making in the expansion of charging infrastructure, but also provide evidence that can be used to justify its implementation to residents who may otherwise be reluctant to agree to additional uses of limited public space.

One spot, many services

Space is a luxury in urban areas, and a charging point is an additional element city planners have to take into account when having to make choices on how to allocate public space to make their cities pleasant to live in for everyone. So, in addition to planning the charging infrastructure based on use and real needs, thereby reducing the amount of unnecessary charging points, cities are also testing innovative and original solutions to offer charging services that are multifunctional and have lower impact on urban streetscapes.

Take, for instance, the city of Turku, another USER-CHI project partner, which will test the use of charging boxes with integrated renewable energy sources for light electric vehicles. This solution will therefore combine renewable energy use, charging and safe parking possibilities for e-bikes.

Budapest has also decided to concentrate several e-services in one to make the most of space. The e-mobility stations that will be set up in the framework of the USER-CHI project will offer different e-mobility functions, such as e-car, e-scooter and e-bike chargers, together with tablet chargers, public lighting with sensors, and car sharing docking stations.

Budapest and Turku are not alone in encouraging alternative e-mobility services to privately owned electric cars. Other major cities from across the EUROCITIES network offer a broad range of subsidies to promote e-bike demand, such as publicly procuring fleets of electric bicycles, offering purchase subsidies to consumers and small businesses for electric bikes and cargo bikes and funding temporary rental schemes. A highly competitive example comes from Berlin, where a €200,000 funding programme for cargo bikes was exhausted within a single day and was relaunched with double the budget.

Multilevel cooperation for a clean transition

Europe's larger cities are clearly crucial actors in getting this transition



right and more focus should be put on the clean transition of public transport and sustainable urban modes. But managing these projects and upscaling the most successful initiatives will require much closer cooperation between the different levels of government.

The response to COVID-19 has hit city budgets hard. Going forwards, we should see new governance structures that enable city authorities to collaborate with national authorities on charging infrastructure deployment strategies, as has been the case for Oslo and Norway where we have seen the fastest uptake of electric vehicles in Europe.

The e-revolution is already here, we just need to charge it up right. ●

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Wolfgang Teubner, Regional Director Europe, ICLEI – Local Governments for Sustainability: “Mannheim2020 provides the opportunity for a dialogue between all levels of government and key stakeholders on how we can turn the Green Deal into reality”

Wolfgang Teubner is the Director of the European Secretariat of ICLEI – Local Governments for Sustainability, a global network of more than 1,750 local and regional governments committed to sustainable urban development. In this interview, Mr. Teubner talks about the 9th European Conference on Sustainable Cities & Towns (Mannheim2020), where local and regional leaders, European and international institutions and some of the brightest minds working on cutting edge research, businesses and the civil society will virtually meet to forge a more sustainable Europe.

Mannheim2020 will provide local governments with the opportunity to have their say on the European Green Deal. Why is this important?

The Green Deal is a reorientation of the EU Budget towards climate neutrality and sustainability combined with changes in the strategic and regulatory frameworks that support this development. However, most of the relevant measures and investments will ultimately happen at the local and regional level.

Therefore, local governments need to ensure that regulations and relevant financial instruments are in line with the local needs in order to optimise the impact in line with the envisaged goals. In addition, local governments

need to ensure that the measures taken are supporting and protecting the quality of life of the people and take social equity and fairness into account.

One of the topics to be covered during Mannheim2020 is the tension between economic growth and globally limited resources. Currently, COVID-19 is showing us how the economy gets stuck when we only consume what we strictly need. What could be learnt from this situation?

The COVID-19 crisis is a very special situation that is temporarily restricting our lives in many ways. However, it would be false to draw any long-term conclusions on consumption from this particular situation, since many of the reductions are forced and only accepted because people know that they will pass.

As soon as the restrictions will be reduced, consumption is likely to gradually go back to pre-COVID-19 levels, although some things, like air travel, might be reduced for a longer time. However, we need to acknowledge that we will not be able to sustain unlimited growth in a limited global system.

This is particularly concerning our wealthy societies when we, at the same time, consider the level of growth that is still needed to get people in other parts of the world out of poverty and to allow them good education, health and a fair quality of life. Already now, growth is largely driven by the needs of the monetary system, since we can constantly produce money as an artificial

resource that is ultimately leading to demands on natural resources

that are going beyond the global boundaries. This is why we need a gradual change towards a more stable and circular economic system without permanent growth. This includes a new perspective on what and how we consume. For example, to use and share goods instead of owning them, and to have less goods and more services. This needs the combination of technological innovation and cultural change.

Transforming our cities towards sustainability needs to be done hand in hand with social justice. Again, COVID-19 is clearly teaching us how social differences are creating a gap in facing this pandemic. How can cities be transformed in a way that truly leaves no one behind?

This is certainly a challenge that can first and foremost be tackled by cities. Social differences are mainly caused by the logic of our economic

system and markets. However, when we invest in energy systems and energy efficiency, in sustainable transport and mobility, in housing, education and other services, we have to make sure that the costs are not burdening the socially weaker parts of the population and that the benefits are reaching all inhabitants equally.

Further to that, cities can support the creation of local and regional value



chains and a favourable environment for new and innovative businesses that create sustainable jobs.

Cities and regions are becoming more and more digitalised. What are the social and environmental impacts of this?

In my opinion, digitalisation, as most revolutionary technologies, has a lot of potential and deep impacts that can be both positive and negative, depending how and for which purposes they are applied.

We will definitely need digitalisation to increase our knowledge through measuring and creating data for monitoring in many fields, for example emissions, air quality, transport and mobility, and many more. It can and, hopefully, will support the further changes in our energy production and distribution systems and help to accelerate the full switch to renewable energies through the management of linked decentralised production, volatility in production, and the link to storage.

However, particularly in the field of digitalisation, we have to ensure that artificial intelligence and automatisations are not leading to massive job losses and that business and value chains are not delocalised, as this is a trend in platform and surveillance economy.

We can already see that profits and employment linked to internet shopping or services like UBER or RB&B are often created elsewhere and contributions to local, regional and, often, also national public tax income and social insurance are marginal, while negative impacts are noted locally.

How can cities build their resilience during these times? Any specific tools you would recommend to that end?

In relation to the current crisis, I would say during the acute period it is more about immediate mitigation

measures than building resilience. However, the crisis as such is a good indicator of systemic weaknesses regarding resilience. We, at ICLEI, together with scientific partners and cities have developed a number of tools, for example the Smart Mature Resilience (SMR) tools that are accessible online. (<https://smr-project.eu/tools/>).

Resilience is often facing the issue of a conflict with the ruling economic principles of cost efficiency and cost saving, since it is often related to reserve capacities, back-ups, storage, protection measures, etc. that are either incurring some additional costs or are seen as unused resources in non-crisis periods. In addition, the costs avoided during crises are often difficult to calculate or not calculated as a balance. It is also difficult to predict the causes of future crises, but in cases of insecurity, the precautionary principle might be good advice to follow.

The youth have repeatedly shown their great concern for their future through their demonstrations and actions. What can we learn from them?

I think the most important point here is that they are looking further in the future than the generation that is currently ruling our countries and economies, who are by and large still very much dominated by short-term thinking.

Too often, we forget that emissions and the destruction of natural systems caused today, severely affect the lives of younger generations and indeed future generations. Often there is the negative perception that decisions made today, especially those that relate to climate change, will not have much impact within the lifespan of the ruling generation. This seems to make them hesitant to act consequently.

We urgently need to live up to our responsibility toward younger

generations and generations to come and to act rapidly and consequently for the protection of the lives of future generations. There is no doubt that this includes not only technological changes, but even more importantly socio economic and cultural changes.

If you were to encourage Mayors, urban stakeholders, researchers, innovators... to attend Mannheim2020, what would you say?

Regardless of its format (due to the ongoing COVID-19 pandemic, we have decided to host Mannheim2020 as an online event), the 9th European Conference on Sustainable Cities & Towns is happening at a crucial moment in time.

We have a new European Commission that has managed to set carbon-neutrality of the EU as a key goal for 2050 and is on the way to shaping the Green Deal as a new encompassing strategy towards this goal, including economic and social development.

However, this strategy will need both, vertical cooperation across all levels of governance, as well as horizontal cooperation across all relevant stakeholders on each level to make it really happen.

Mannheim2020 provides the opportunity for a dialogue and discussion between all levels of government, but also with key stakeholder groups on how we can turn this ambition and goals into reality.

In line with our role, we will keep a particular focus on cities and regions, where most of the changes will have to be implemented and where the interaction and participation of people will have to be organised. Representatives of all relevant groups are invited to participate and get actively involved in the debate. ●



Image: Wirtschaftsförderung / Ben van Skyhawk

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Fuel cells and hydrogen technologies: Europe drives ahead

By Bart Biebuyck, Executive Director of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU)

Europe is leading the way in developing the breakthrough technologies needed to realise hydrogen's energy potential. From performant electrolyzers to fleets of buses and refuelling infrastructure, FCH JU demonstrated that the technology can be used on a large scale.

Europe is a global leader for renewable energy, and fuel cells and hydrogen (FCH) technologies are a major part of that mix.

Hydrogen can contribute up to 24% of Europe's energy needs, reduce annually CO₂ emissions by 650 million tonnes, create 5.4 million jobs and generate EUR 820 billion annually in Europe by 2050, according to an [FCH JU study](#).

Fuel cells and hydrogen technologies will be essential for achieving the multiple goals of the European Green Deal and the recovery plan. In addition to supplying clean, affordable and secure energy, FCH technologies will also reduce GHG emissions, promote resource-use efficiency and support the new

Circular Economy Action Plan.

"Hydrogen will become key for industrial sectors," said European Commission President Ursula von der Leyen in a recent [speech](#). "We want to stimulate investment and we want innovation all across the value chain. We want to involve industries, be they large or be they small. We want to create lead markets for new technologies."

As a public-private partnership between industry and the EU, FCH JU has co-funded over 260 cutting-edge research and demonstration projects since 2008 to bring the technology to the point where it is being used successfully across different sector.

Better electrolyzers

The advance made to develop

innovative electrolyser technology is one example of the success in delivering breakthrough hydrogen production technologies to the market. Electrolysers generate renewable energy through a process whereby electricity splits water into hydrogen and oxygen.

Electrolyser technologies are key to the production of green hydrogen energy, paving the way for the large-scale rollout. To help achieve this, FCH JU-funded projects are developing more affordable, efficient and reliable electrolysers.

The [NEPTUNE](#) and [PRETZEL projects](#) are developing breakthrough solutions for proton exchange membrane (PEM) and solid oxide (SO) electrolysers. Europe is a world-leader in these technologies, as shown by a recent analysis of relevant publications and patents.

[H2 Future](#) is showing how PEM electrolysers can power the European steel industry. Meanwhile, [DJEWELS](#) is demonstrating the operational readiness of the world's largest high-pressure alkaline electrolysis (AE) electrolyser, to be used for the large-scale production of hydrogen and also green methanol.

Accelerating the rollout of hydrogen buses

The FCH JU has been funding several projects focused on the demonstration of hydrogen fuel cell technology for transport, while at the same time expanding the hydrogen



“ Through its demonstration projects, FCH JU has built a sound business case for hydrogen fuel cell buses as a means of decarbonising public transport. ”

refuelling infrastructure network.

In this area, projects such as Clean Hydrogen in European Cities (CHIC), 3EMOTION and High V.LO-City, have demonstrated the suitability, sustainability, reliability and financial viability of hydrogen fuel cell technology for buses in many cities. This has made an important contribution to their commercialisation in Europe.

The recent JIVE (Joint Initiative for hydrogen Vehicles across Europe) projects are planning to roll out more than 300 hydrogen buses in 22 cities across Europe, the largest deployment to date. Given the potential size of the European market, estimated recently by FCH JU at around EUR 2.3 billion, this could expand to over 1 000 buses by 2025.

Through its demonstration projects, FCH JU has built a sound business case for hydrogen fuel cell buses as a means of decarbonising public transport. The partnership brought together manufacturers, operators and public authorities. As a result, a new generation of hydrogen buses is being developed, involving up to 10 bus manufacturers.

FCH JU projects are also deploying more than 1,500 Fuel Cells Electric Vehicles (FCEVs), including taxi fleets in Paris and Brussels.

Refuelling stations

Although hydrogen-powered vehicles can travel up to 400 kilometres without refuelling, there is a need to extend the network of refuelling stations across Europe. FCH JU-funded projects are working to overcome the barriers to deploying refuelling stations, to facilitate the uptake of fuel cell electric vehicles.

Currently 67 new hydrogen-refuelling stations have been deployed, including a mobile one for buses and commercial vehicles. Out of these, 55 are car-only refuelling stations, spread across 10 countries. As the number of stations increases, it brings significant reductions in their footprint and cost. It's worth mentioning here that FCH JU projects are using approximately 90% green hydrogen to fuel the vehicles deployed through them.

However, FCH JU did not stop there. A key long-term aim is to establish a common European system that gives drivers real-time information on

the availability of hydrogen refuelling stations (<https://h2-map.eu/>).

Hydrogen Valleys

Finally, we wanted to put all these pieces together, to demonstrate how hydrogen technology can foster economic growth in the European regions while answering to the local energy needs and reducing pollution. Hence the concept of 'Hydrogen Valleys' – which are geographical locations where activities encompassing the entire hydrogen value chain, from production to end-use, are integrated to improve the economics of FCH technologies.

Entry the project Heavenn, which is establishing Europe's first 'Hydrogen Valley' in the Northern Netherlands. Here, it will connect the entire hydrogen chain, with the involvement of 31 public and private parties from 6 European countries.

With the 2020 Call for Proposals the FCH JU has taken this one-step further and we're looking at funding projects that apply the 'Hydrogen Valley' approach to islands and island regions, to meet the specific challenges of decarbonising island economies. ●

About the FCH JU

A unique public-private partnership, the FCH JU contributes to the development of sustainable and globally competitive FCH technology in Europe. By bringing together a wide range of industrial and scientific partners, it supports EU approaches on sustainable energy and transport, climate change and industrial competitiveness.

More info:

[The Fuel Cells and Hydrogen Joint Undertaking](#)

[Fuel Cell Electric buses](#)

Let's not reinvent heat pumps!

For a successful “Renovation Wave”, spread the right word!

By Eirini Litina & Oliver Jung, EHPA

We are living in transformative times. Times when we need to re-evaluate everything we know. Everything we are. Everything we want to achieve as a society. This also applies to our energy system: from the way that we produce or consume energy to the selections we make when we renovate our buildings.

The recent announcement from Europe's leaders to make a green and digital energy transition the top priority for EU's economic recovery should aim at making this possible. With this regard, the upcoming “Renovation Wave” has

been announced to be the flagship initiative of the EU Green Deal aiming to decarbonise the EU building stock. It is a unique opportunity to simultaneously tackle the climate crisis while delivering concrete benefits to European citizens such as cleaner air in cities, creation of jobs and improved comfort & well-being.

Quite surprisingly, the most important component of the energy consumption of buildings (80%) has been rather absent from high-level public declarations. Heating and cooling represents 50% of all energy consumed in the EU. Heating and cooling is currently produced from

fossil fuel sources in 75% of the cases. Heating and cooling is subject to – poorly advertised – specific national reporting requirements (see the “[comprehensive assessments](#)” to be submitted in December 2020). Beyond that, heating and cooling is crucial for the daily lives of citizens and business. It needs therefore to become one of EU's “hottest” topics.

Looking at the heating and cooling solutions that can make the Renovation wave, a wave of change not only of buildings but of the overall experience of being at home; at the office; in multi-family houses; in social housing...

Social houses using heat pumps for heating in Lithuania.



...the very fundamentals do probably not need to be reinvented!

After almost 200 years of existence, heat pumping technologies offer today a variety of solutions for heating, cooling, and domestic hot water production, which are ready-to-use for the large majority of the residential and commercial building stock in Europe, as well as for industrial processes and city grids.

Heat pumps use renewable thermal energy from air, water, ground or sewage water. They apply circular economy principles when recovering energy and waste heat. Heat pumps support better levels of indoor and outdoor air quality. They also help electrified buildings to act as a flexible resource for a decarbonised energy system and bring even higher benefits in combination with photovoltaic or other renewable and efficient solutions.

Nearly 7000 heat pumps were installed daily in 2019. Since this value has to more than double to meet Europe's 2030 Climate and Energy targets a dedicated European Heat Pump Strategy is required. The Strategy should certainly address market-related aspects, notably to allow clean electricity to be in transparent competition with other energy carriers. The Strategy should also



explore ways to increase the awareness on the multiple benefits of heat pumps for EU's citizens and energy system. As the major challenge today is not to develop new technologies but to help deploy the mature and proven ones.

Having this in mind, the European Heat Pump Association compiled a [booklet](#) of best practice examples of heat pumps working in the renovation sector. The examples illustrate how heat pumps are successfully functioning while bringing economic, environmental and social benefits to European citizens.

Heat pumps were selected as the most preferred solution when renovating social houses in Lithuania,

in warehouses in the port of Amsterdam, in eight tower blocks in London, in a smart community demonstration project in Manchester, in a 400m² office space in Austria, in a single-family house in Italy.

All these examples prove that replacing old and inefficient heating technologies with heat pumps can significantly reduce heating and cooling costs, reduce CO₂ emissions, improve the indoor air quality and bring us closer to positive energy buildings.

Please take a minute to surf at the [booklet](#). More material, stories and data can be also made available upon request. In these transformative times, you too can be part of greater change just by spreading the right word. ●

EHPA description

The European Heat Pump Association (EHPA) represents the majority of the European heat pump industry. Its members comprise of heat pump and component manufacturers, research institutes, universities, testing labs and energy agencies. Its key goal is to promote awareness and proper deployment of heat pump technology in the European market for residential, commercial and industrial applications. EHPA aims to provide technical and economic input to European, national and local authorities in legislative, regulatory and energy efficiency matters. All activities are aimed at overcoming market barriers and dissemination of information in order to speed up market development of heat pumps for heating, cooling and hot water production.



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(until 15 June)

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ORGANISE AN ENERGY DAY

Digital events will take place all over Europe, engaging local communities **throughout June**.



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